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VOL. XXXIX, NO. 5 WASHINGTON MAY, 1921

THE
NATIONAL
GEOGRAPHIC
MAGAZINE

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WESTERN SIBERIA AND THE ALTAI MOUNTAINS

With Some Speculations on the Future of Siberia

BY VISCOUNT JAMES BRYCE

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SINCE JULY, 1914, no American, Englishman, or Frenchman, except those officers who were sent out on military missions, has had a chance of traveling along the great Transcontinental Railway which connects western Europe with China and Japan; so before I come to speak of the Altai Mountains, it is worth while to say something of this wonderful highway of commerce, along which I passed in 1913, on my return to England from Japan.

From Calais, on that arm of the Atlantic which we call the English Channel, to Vladivostok, on that arm of the Pacific we call the Sea of Japan, it is more than 7,000 miles, while from New York to San Francisco it is only about 3,000 miles.

An interesting comparison may be made between these two transcontinental roads, on opposite sides of the world, linking the Atlantic with the Pacific.

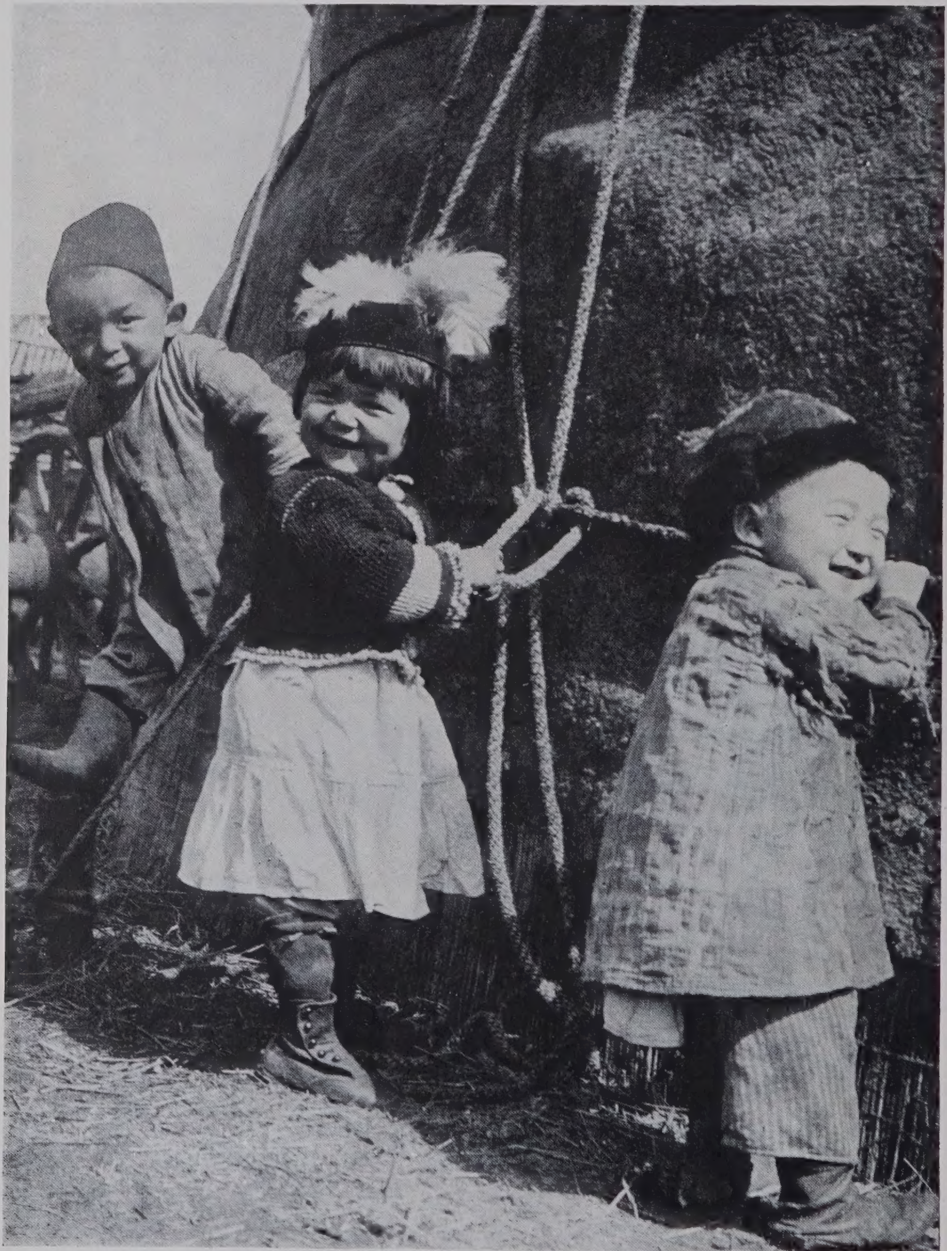
Each when it leaves the Atlantic coast runs for more than 1,500 miles through civilized and thickly peopled regions, mostly agricultural, though studded with cities. Each when it approaches the center of the continent climbs a mountain range and passes over vast tracts of wild and thinly inhabited country, sometimes through deserts, sometimes through forests. Each crosses great rivers; each coasts along the shore of a large and beautiful inland sea. Each emerges finally from the solitudes of its middle course into a rich and prosperous land and finds its end at a famous harbor—the American Transcontinental at San Francisco, the Asiatic Transcontinental at the equally spacious and well sheltered, if less beautiful, port of Vladivostok.

Along both roads there is a great variety of scenery, much of it striking, but the Asiatic line has an interest that is all its own in the variety of the peoples also through which it passes. One language only rules from the Hudson to the Golden Gate, whereas between Calais and Vladivostok many tongues are spoken and many races of men—Hollanders and Germans, Poles and Lithuanians and Russians, Bashkirs and Buriats, Manchus and Chinese—have their homes.

FROM CALAIS TO MOSCOW

The best way to enjoy the Asiatic Transcontinental journey is to begin at the west end and travel east, whereas the American Transcontinental should be taken from the east toward the west, and for the same reason, viz., that it is more interesting to start from civilization and pass by degrees into wilder regions, more solitary and more picturesque, which keep curiosity constantly alive, than it is to reverse the process.

So, although it was my own fortune to have to travel from the east to the west, I will venture to conduct the reader the



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KIRGHIZ CHILDREN AT PLAY

There are more than three million members of the Kirghiz family—a Mongolian people inhabiting an area of nearly 3,000,000 square miles, extending from northwest China to the lower Volga River. There are two main branches of the family—Kara, or Black Kirghiz, so called from the color of their tents, and the Kazaks, or riders, from which term the word Cossack is derived.

Photograph courtesy Department of Commerce

A GROUP OF SIBERIAN CHILDREN IN FRONT OF A COÖPERATIVE STORE ESTABLISHED BY THE SIBERIAN GOVERNMENT FOR THE DISTRIBUTION OF PROVISIONS TO THE NEEDY

other way, *i. e.,* from western Europe to far eastern Asia. (See the National Geographic Society's Map of Asia, issued as a supplement with this number of THE GEOGRAPHIC.)

Of the comparatively familiar 1,600 miles or thereabouts from Calais to Moscow, nothing need be said, except that so far as the aspects of nature are concerned they are comparatively monotonous, for the surface is an almost unbroken level, only one group of low mountains in Westphalia rising out of the sandy plains of western and central Germany.

From Moscow onward the land, though generally flat, has its undulations; but to the eye of a naturalist it continues to be somewhat uniform, for there are very few deep railway cuttings to indicate the rocks that lie beneath the surface, and as the country traversed is nearly all either cultivated or forest-clad, few wild plants are seen, and these, the latitude being the same, are of the usual Central European types.

The first striking view is reached at the town of Samara, where the broad Volga, greatest of European rivers, is crossed by a long and lofty bridge, more than five hundred miles above the point where it enters the Caspian Sea. Here for the first time one feels a change in the air, for here begins the dryness of the Asiatic steppes.

CONSUMPTIVES CAME TO DRINK MARES' MILK

Thirty-seven years ago, when I sailed down the Volga, the railway ended at this point. Thither, in that day, consumptive patients used to come from northern and middle Russia to drink mares' milk and gain strength in the invigorating breezes that came from the southeast over arid plains. It was then the summer sanatorium of Russia, as the south coast of Crimea was the winter resort of those rich enough to travel so far.

A hundred miles beyond the Volga blue heights appear on the eastern horizon, and we quickly enter the foothills of the Ural range, their gently rounded slopes descending into charming villages, pasture alternating with open woods which

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SETTLERS FROM EUROPEAN RUSSIA ARRIVING AT A RAILWAY STATION IN SIBERIA

The conquest of Siberia by Russia began in the reign of Ivan the Terrible, who gave to two merchants the right to build forts on the rivers Tobol and Irtish. These merchants, Jacob and Gregory Stroganov, hired 800 Cossacks, under the leadership of the Volga River pirate, Yermak, to protect their recently acquired territory. This band penetrated far into the interior and in 1581 captured Sibir, capital of the Siberian Tatar Empire.

distantly suggest those of the "Parks" of Colorado—woods not thick, because the climate is dry, but scattered in picturesque clumps over hill and dale.

As the line pierces deeper into the mountains, the glens are narrower and are filled with a denser forest, out of which bare summits rise to heights of three or four thousand feet. It is a lonely land, with few and small villages, but it is rich in gold and silver, copper, coal, and platinum—from here comes nearly all of the world-supply of that metal—with an extraordinary variety of rare and valuable stones.

The train takes about seven hours to traverse this picturesque region, stopping here and there at a busy mining town, and passing an obelisk which, at the summit level, marks the frontier of Europe and Asia. Thereafter it emerges suddenly (for the Asiatic slope is shorter and steeper than the European) on the boundless plains of Siberia, here bare and almost waterless as are those of Arizona, but drearier, for there are here no rocks or hollows to diversify the surface, no glimpses of distant peaks to break the level line of the horizon. It is the dullest part of the whole journey from ocean to ocean.

IRTISH, THE WESTERNMOST OF SIBERIA'S FOUR GREAT RIVERS

But presently one comes, at the thriving town of Omsk, which was in 1918 the headquarters of Admiral Kolchak in his campaign against the Bolsheviks, to the first of the four great Siberian rivers, the Irtish, which, having risen far away to the south in the hills of western Mongolia, is here on its northern path to join the Obi and send its waters into the Arctic Sea.

To the Obi itself, an even fuller stream, we come in eight hours more, and see a flotilla of steamers moored to its bank. But of it more anon, for up it one voyages to the Altai. From this point onward the country is rougher and thinly inhabited, for much of the land is the sort of forest swamp which the people call *Taiga*.

On each side of the railway track the woods have been cut back to leave an open space of fifty to one hundred yards wide, so that sparks or coals from the locomotive will not start a conflagration. This open, wide grassy belt is in summer covered with a luxuriant growth of tall flowers on each side of the line, giving the effect of what gardeners call a "herbaceous border," with the railroad track for the gravel walk between the two flower beds.

Behind stand the pines, with their tall, straight, reddish trunks, contorted boughs, and dark-green foliage, beautiful as are those of the Scottish Highlands.

THE YENISEI, GRANDEST OF SIBERIAN RIVERS

After many hours' journey through this delightful parterre, the traveler sees beneath him in a valley, three hundred feet deep, the grandest of all the Siberian rivers, the Yenisei, with the city of Krasnoyarsk lying on the slope between the station and the stream.

This is the finest view of a river from a railroad I can remember to have seen anywhere. The Mississippi at St. Louis and the St. Lawrence at Montreal are as wide, and may have as great a volume; but their banks are comparatively low. Here the *coup d'œil* of the bold heights and the mighty stream filling the long hollow that winds away to the north between rocks and thick woods, is magnificent.

The stream is seen to advantage from both sides, for the track stoops down more than a hundred feet to cross the valley by a lofty bridge, and rises again as much on the eastern slope, making a wide semicircle.

Thirty hours more bring us to the fourth river at Irkutsk, that capital of eastern Siberia for which the contending Bolshevik and anti-Bolshevik armies fought so long in 1917 and 1918. It is the Angara, bearing down a tremendous torrent of clear green water from Lake Baikal, which the train reaches before long.

BAIKAL, ONE OF THE WORLD'S GREAT INLAND SEAS

Lake Baikal is one of the great inland seas of the world, nearly as long as Lake Superior, though not so wide, for in clear weather the eye can reach from the one shore to the other. It fills a bow-shaped depression four hundred miles long, between high mountains dipping steeply into its waters; and on its coasts there are only wood-cutters and fishermen, with a few hunters.

Till long past the middle of last century, some while before the Transcontinental railroad was built, there was no way from the west into the lands of the Amur River and Manchuria except by a ferry across the lake of some twenty or more miles in the summer, or by sledging over its icy floor in winter, and the travelers of those days loved to describe the midnight drive under a brilliant moon.

Now the line runs for many miles along its southern shore on a shelf cut out of the steep mountain side, high above the waves, with frequent tunnels through projecting cliffs.

It was supposed, when fighting began there in and after 1917, that any retreat-

Photograph by C. S. Stilwell

A SIBERIAN PEASANT

His is a land forty times as large as Great Britain and Ireland, but with only one-fifth the population.

ing force would be likely to cover its rear by destroying the track in some part of the shelf, behind or above which no passage could be found. I have not, however, been able to learn whether this has happened.

The line runs high along the curving shores for forty or fifty miles, affording a succession of splendid prospects. Beneath are woods, mostly of birch and aspen, richly yellow in autumn, and wherever they have been cleared the space is filled by a profuse growth of the tall willow herb (*Epilobium angustifolium*), called in North America the fireweed, whose deep pink blossoms make a waving sea of color, stretching mile after mile till all tints melt into the blue of distance.

Solemn and lonely in its mountain setting, the Baikal yields in grandeur to only one other fresh-water sea, Lake Titicaca, on the plateau of Bolivia, above which tower the peaks of the Cordillera Real, the finest line of snows in all the ranges of the Andes.

WHERE THE TRANS-SIBERIAN DIVIDES

Presently the railway, leaving the lake, turns south up the valley of the Selenga River, and thence climbs the slopes, and threads for many miles the ravines of the great mass of rugged and almost uninhabited highlands which figure on our maps as the Yablonoi Mountains. Beyond these come wide plains, and beyond these plains another mountain range, till at Harbin the line divides, one branch turning southwest to Peking, the other southeast to Vladivostok.

Henceforward there are no more Russians to be seen, nor the Buddhist or spirit-worshiping tribes over whom Russia rules, for we are now in Manchuria, where the population is mainly Chinese.

From overcrowded China the industrious Celestials, no longer wearing pig-tails (for the Republic abolished that custom), swarm out in all directions; and had not the Russians in the middle of the last century established their power in the country south of the Baikal and all down along the Amur River to the sea, these regions would have soon been peopled by Chinese emigrants.

The last part of the way from Harbin to the Sea of Japan is, perhaps, the most beautiful, for the soil is fertile, the pastures excellent, the landscapes charming, and the wealth of flowers surpasses that of western Siberia. Even after seven or eight days of unbroken travel from Moscow, the summer tourist comes reluctantly to the end of such a journey.

All that stopped in 1914. When will any tourist find the journey possible once more?

So soon as peace and order have been restored, under whatever government may rule, that government will begin to repair and equip the railroad; but to do this from end to end, through a country impoverished by years of war and blockade, will be no short or easy task.

So much for the Transcontinental Railway, the one great factor in the social and economic life of Siberia which those who wish to understand the country must keep always in mind.

Now let me speak of western Siberia in particular, and of the excursion into the Altai Mountains which I have to describe.

Photograph from Horace Brodzky

TWO RUSSIAN GYPSIES OF IRKUTSK

PREPARING FOR A TRIP TO THE ALTAI MOUNTAINS

In 1913 Siberia was just as open to travelers as was European Russia, but everywhere in the Tsar's dominions whosoever sought to diverge from a regular railway or steamboat route found that he could not get along without facilities granted by the government.

Before starting for the mountains it was therefore necessary to obtain letters of recommendation to local authorities, and the official permission to call for horses at post stations. To get these indispensables I went to Tomsk, the administrative capital of western Siberia, to present to the Provincial Governor the credentials I had brought along with me.

Tomsk lies fifty miles north of the Transcontinental Railroad, to which it is joined by a branch line. Why, considering the importance of the city, was not the main line made to run through it, there being no engineering difficulties to prevent this?

Every traveler asks this question, and receives—so, at least, I was told—the same answer. The Tomsk people did not pay a sufficiently high "gratification" to those officials with whom it rested to prescribe the course of the railway.

I was reminded of a like question and a like answer when, three years before,

Photograph from Ella R. Christie

FLOWER GIRLS AND BOYS AT A WAY STATION ON THE TRANS-SIBERIAN RAILWAY

being on the west coast of South America, I inquired why large sums were being expended on the construction of harbor works at Antofagasta when, only a few miles away to the north, there was a better sheltered bay at Mejillones. "Because," was the reply, "there was nobody at Mejillones to put up the money that was needed to outbid the people who wanted the harbor to be at Antofagasta."

WHERE COURTESY BECAME A TRIAL

We arrived at Tomsk at 1 a. m. and on stepping out of the cars were received by a bevy of uniformed officials, headed by the chief of the police, a grave personage, decorated with seven medals and six orders (crosses and ribbons). In Russia under the old régime orders and medals were distributed according to length of service and the satisfaction given to the superiors in the department, and the medals determined and indicated the salary paid, a useful method in a bureaucracy both of securing perfect subservience and of impressing the mind of the undecorated private citizen.

We were driven three miles through woods to the city—in Siberia, as in India, stations are apt to be far from towns—and lodged in a passable hotel, where, however, though it was August, no window was open or could be opened, and baths were unattainable.

No one spoke anything but Russian, and as I had forgotten the little I had learned thirty-seven years before, the position was difficult. Our police chief's sense of duty and politeness compelled him to remain along with us, though it was now 2 a. m. and our grateful and frequently repeated bows did not seem to intimate to him that his further stay was needless.

Searching up and down through a Franco-Russian phrase book, I could find, as usually happens, no sentence that fitted the occasion, but many that seemed

Photograph from Ella R. Christie

THEY HAVE HAD FEW TRAVELERS TO BUY THEIR POSIES DURING THE LAST SIX YEARS (SEE ALSO ILLUSTRATION ON OPPOSITE PAGE)

designed for occasions far less likely to occur, among which I recollect this: "Have you seen the crocodile?"—a question singularly inappropriate in an empire none of whose waters are warm enough for that animal.

At last, however, we found words the equivalents to "Many thanks," and "Farewell," and the highly decorated Tchinovnik (the Russian term for a member of the civil service) departed, returning next morning to bring with him a Danish gentleman, a mining engineer, who spoke English and proved very helpful, discovering for us an interpreter to accompany us on our journey. We were surprised to find that in a city of sixty thousand people nobody, except one or two university professors, seemed able to speak either German or French.

CELEBRATING THE "NAME DAY" OF THE TSAREVITCH

When we awoke next morning all the bells were clanging, for it was the "Name Day" of the Tsarevitch, the delicate child destined one day, if his thin thread of life could be kept from breaking, to mount the imperial throne and rule over nigh two hundred millions of men.

All the functionaries of the city—military, civil, and educational, each

Photograph by W. W. Cutler, Jr.

A FREIGHT-BOAT ON THE OBI, ONE OF THE FOUR GREAT RIVERS OF SIBERIA

Rising in the Altai Mountains and flowing northward into the Gulf of Obi, an inlet of the Arctic Ocean, the Obi has a total length of 2,000 miles, 1,600 of which are navigable.

decked out with his orders and medals—flocked to the cathedral to attend the solemn service in honor of the day. The service was long, as those of the Orthodox Church always are, and only the sweet voices of the choirs relieved its tedium.

We knew that all over the Russian dominions, from the Baltic to the Pacific, every official and every priest and bishop was imploring the blessing of God upon the boy whose life was so precious.

As the worshipers bowed and knelt, as the voices sank and rose, what a wonderful thing, we thought, is this Russian Cæsarism, what a hold it has on the obedience, if not the affection, of its subjects, buttressed as it is by the Orthodox Church, with an omnipresent army of officials to execute its will! But within five years the innocent boy was, with his parents and his sisters, murdered in a cellar at Ekaterinburg, in the Urals, and not a Russian voice throughout what had been the Empire of the Tsars was raised in anger or in sorrow.

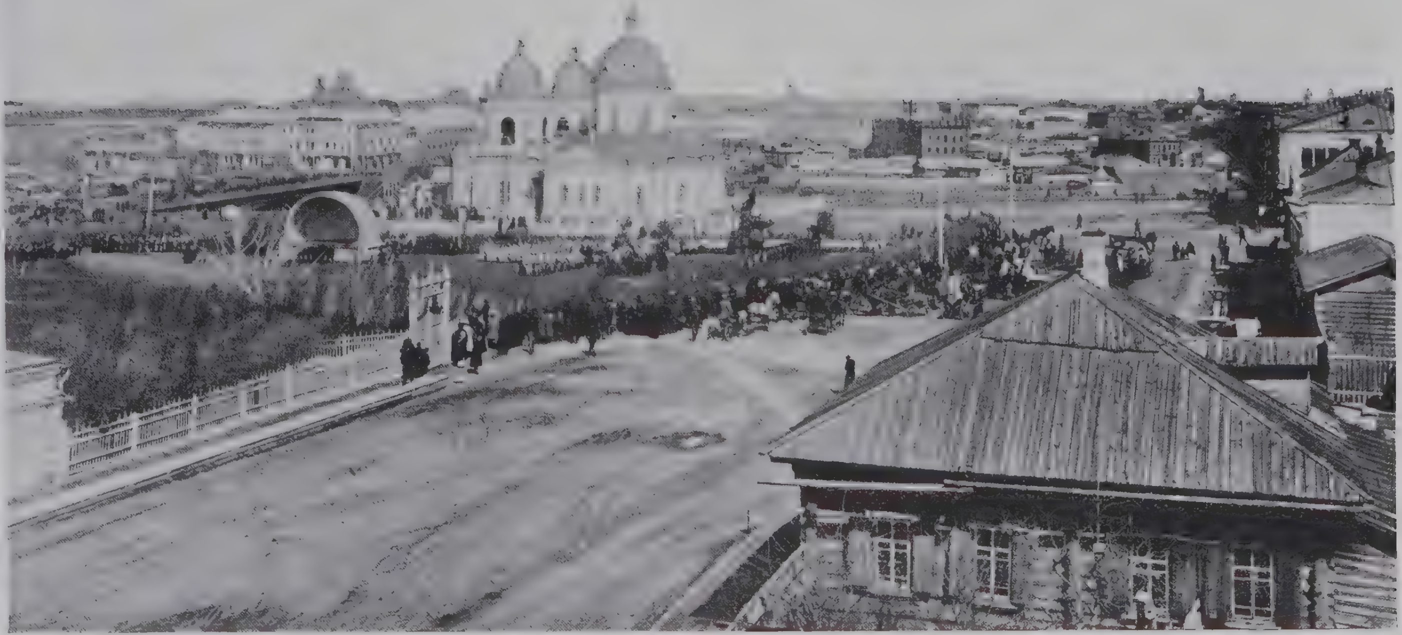
THE LEGEND OF TSAR ALEXANDER AS A HERMIT

Tomsk is a large, irregularly built town, straggling from a hill on which stand the cathedral, with its three bulbous domes, and the huge barrack-like university, where law and medicine were being taught to a thousand students, down to the river Tom, navigable for small steamers and carrying a considerable trade.

From the other side of the stream the place looks quite picturesque, brightened by the colors of the church domes and roofs, painted blue or light green, and the house roofs also often red or green; so the general aspect has, from without, a gaiety which the interior belies.

Of the inhabitants, all Russians, for the thinly scattered native tribes live far off to the north, about one-third are exiles or the descendants of exiles. Depressing as Europeans think life must be on a featureless plain, where snow lies more than half the year, they seem as cheerful as men are in Berlin or Rotterdam or London.

One strange tale is told, and universally believed, that the Tsar Alexander the First did not expire at Taganrog, on



Photograph courtesy Department of Commerce

A VIEW OF OMSK, FORMERLY CAPITAL OF ALL WESTERN SIBERIA

Eighteen hundred miles east of Moscow, Omsk is the meeting-place of highways to middle Russia, Orenburg, and Turkestan. It is visited by violent sandstorms in summer and snowstorms in winter.

CROSSING THE RIVER OBI IN A ROWBOAT

Siberia has some of the largest rivers on the globe—the Obi, the Irtish, the Yenisei, and the Lena—but their value as freight carriers is greatly reduced by the fact that all have their outlet in the Arctic Ocean. For only a few weeks during midsummer can vessels from western Europe make their way through the Kara Sea, east of Novaya Zemlya, to the Gulf of Ob (Obi).

Photographs by W. W. Cutler, Jr.

A PASSENGER BOAT ON THE RIVER OBI

The cabins of these steamers are small and rough but clean. "From the deck one looks over a wide, smooth plain, the uniformity of the prospect in all directions broken only by the sweeps and curves of the mighty stream" (see text, page 485).

Photograph by D. A. Foster

AMERICAN ARMY OFFICERS IN A SIBERIAN WHEAT FIELD

Agriculture is the principal occupation of the natives of Siberia as well as of the emigrant Russians. It is estimated that half a million square miles of the empire are suitable for cultivation. The chief grain-producing regions are the Tobol and Ishim valleys, the marshy steppe between the Obi and Irtish rivers known as the Baraba, the territory around Tomsk, and the foothills of the Altai Mountains.

Photograph by Maynard Owen Williams

A GLIMPSE OF SIBERIA'S LUMBER INDUSTRY

South of the treeless northern tundras lies the almost illimitable forest zone of Siberia, abounding in birch, larch, and the conifers. With the improvement of transportation facilities, the lumber industry will prove an enormous national asset.

Photograph by D. A. Foster

CHILDREN AT PLAY IN ALEXANDRIA PARK, IRKUTSK

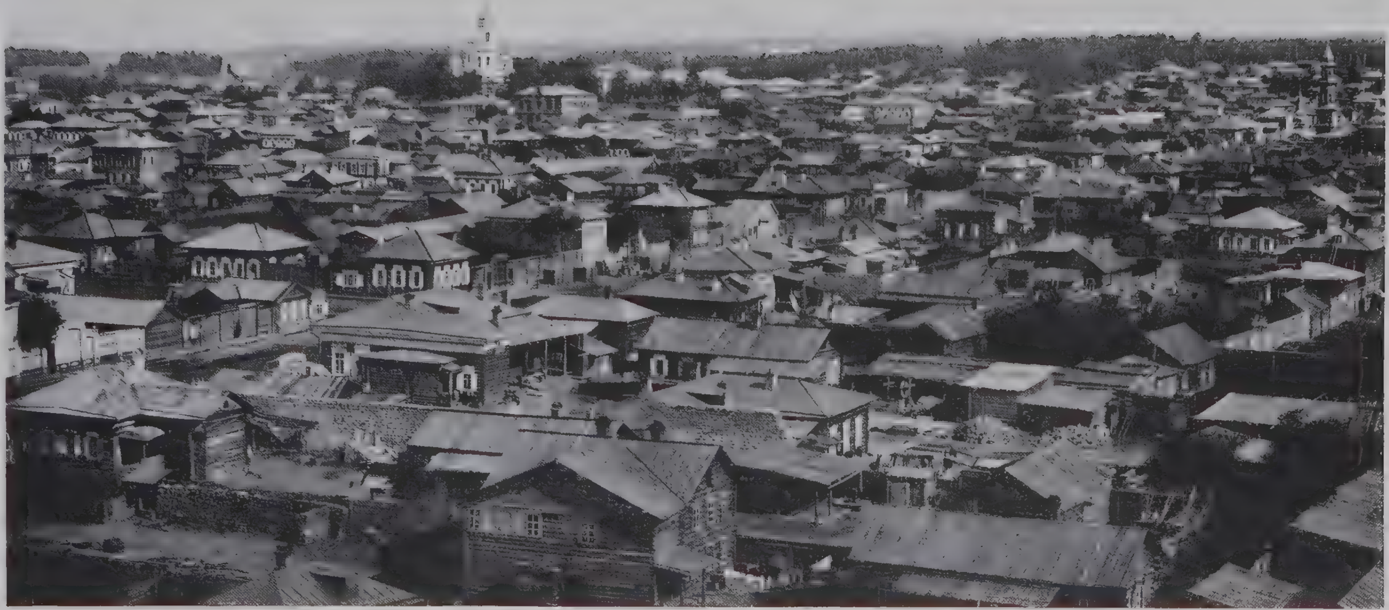
the Don, in 1825, as was supposed, but caused the body of a soldier who had died in the hospital at Taganrog to be represented and buried as his, while he himself secretly stole away in the garb of a pilgrim and made his way among a troop of emigrants to Tomsk, where he thereafter lived a religious life as a hermit till extreme old age.

I was told of men alive in Tomsk who, in their youth, had seen him, but no one could say whether the hermit encouraged the belief that he had been Tsar. If he did, he gained nothing from it, except freedom from molestation and additional veneration from the people. Slight as the evidence for the story seems to be, there was nothing in Alexander's character, pietistic and emotional, to make it impossible.

A MOUNTAIN LAND OF MYSTERY

Now, before I come to the journey, a few words on the Altai. It is the name given to the southwestern part of a great mountain mass which divides the lowlands of Siberia from the plateau of central Asia, sending forth on one side the great rivers that flow north to the Arctic Ocean, and on the other, the southern and drier side of the range, smaller streams that lose themselves in the lakes or marshes of Mongolia.

Most of this vast mountain land is unexplored, and only a small part has been surveyed for the purpose of locating the mineral wealth it is believed to contain. As a boy, I had sought to learn something about it



Photograph courtesy Department of Commerce

A VIEW OF IRKUTSK LOOKING TOWARD JERUSALEM HILL

The Irkutsk Cathedral, originally built of wood in 1693, was rebuilt of stone 200 years ago.

Photograph by D. A. Foster

THE VOZNESENSKI MONASTERY, FIVE MILES FROM IRKUTSK

This ecclesiastical establishment was founded in 1672 and contains the bones of St. Innocent. Most Russian churches are rectangular in form, with five brightly colored domes, the largest of which is in the middle, and each is surmounted by a Greek cross. In the lofty detached tower or campanile are the bells, which are not swung but fixed, only the clappers being movable.

from books of travel, and been able to discover scarce any that had aught to tell; and when I began to read the history of the East, curiosity was reawakened by finding that from the very beginning of history all these regions north and east of the Black Sea and the Caspian had remained unvisited and unknown from the days of Homer down to those of Marco Polo.

Unknown and mysterious, but also terrible, for out of the mists that shrouded them there came from time to time hosts of fierce horsemen, who broke like sudden thunder-storms on the civilized peoples of the eastern Mediterranean and of Europe.

As the Cimmerians and Scythians had descended on Media and Asia Minor and Syria long before the Christian era, so in the fifth century Attila led his Hunnish hordes across Germany into Italy and Gaul, followed by Avars and Bulgarians and Magyars, and in the thirteenth century there came the tremendous invasion of the Mongols under Genghis Khan.

Of this region of mystery and the great mountains that rise in its midst, it was possible to receive some impressions by diverging from the line of homeward journey along the Transcontinental Railway, so we seized the opportunity. Everybody told us that we should have plenty of discomforts or even hardships to encounter, but, being seasoned travelers, we were not deterred, and even, perhaps, put upon our mettle to see whether we could not still "rough it" as in former days.

To reach the glaciers and climb the great peaks would be impossible, for we had no tent or other equipments for high mountaineering, but we could at least have a glimpse to make the mountains live as realities in memory.

A MUSHROOM TOWN IN SIBERIA

Our point of departure was the town of Novo Nikolaevsk, a mushroom growth of the years since the opening of Transcontinental line, for it stands at the meeting point of two great lines of trade—that of the Obi, which brings down the minerals and the grain and the butter from the south, and that of the railway which carries these products eastward to Irkutsk and beyond to the Pacific, westward to Russia and Germany. It reminded me of the new cities in the newest parts of America, with its big warehouses rising fast along half-finished roadways, while the untouched prairie, dotted here and there with scrub birches, lay just outside the houses.

In another ten years, had peace continued, Novo Nikolaevsk would have become the most populous place in all Siberia. By now it may have gone to pieces.

Steamers lay thick along the river bank; and in one of these we embarked. The cabins were small and rough, but clean; the food, scanty and unappetizing, was sufficient to support life; and though the days were hot with a strong August sun, the nights were cool, the dry air of the steppe deliciously fresh and invigorating.

From the deck one looked over a wide, smooth plain, the vast dome of heaven resting on a level horizon, the uniformity of the prospect in all directions broken only by the sweeps and curves of the mighty stream.

THE GRANDEUR OF A GREAT RIVER

Nothing in nature is grander than a great river. It embodies the irresistible strength of the forces of nature and their changeful activity, ever the same and yet ever different, here with a glassy surface, there swirling with deep eddies, making and unmaking islets, here eating away the bank, there piling up sand to enlarge it. It is older than man, and will outlive him: it is a part of his life, serves him in many ways, but it heeds not his coming or going.

These great Siberian rivers specially impress the imagination, because their sources lie in unexplored snowy solitudes, and from their middle course in habitable lands they descend into a frozen wilderness—*terra domibus negata*—to find their ending in an ice-bound sea.

We had just come from a long voyage up and down another famous river, the Yangtze, singularly unlike its Siberian sisters in this, that it is the central avenue of commerce through a highly cultivated country, passing on its way many cities swarming with people, and bearing on its bosom not only steamships, but fleets of sailing craft such as can be seen nowhere on Rhine or Danube or Mississippi, or even on the Nile, where once they carried all the traffic of the country.

Here, on the Obi, not a sail was to be seen and hardly even a rowboat. The steamer calls rarely, and then it is to discharge or take in freight, for passengers are few.

FEW VILLAGES ARE SEEN ON THE BANKS OF THE OBI

Like the Mississippi and Volga in their middle courses, the Obi has scooped out for itself a wide flat or depression about seventy feet below the general level of the steppe and swings itself hither and thither across this flat, so that when it is close under the high bank of the steppe on one side it is far from the high bank on the other side. The banks are of alluvial soil, and usually bare, but the low shores and the islands are covered with a growth of willows and poplars.

The few villages on the banks, usually where a small side stream comes down, are clusters of rough wooden huts, irregular and dirty, with the blue cupola of a whitewashed church rising in the midst.

The peasants, stalwart fellows in colored flannel shirts, crowd down to the landing place when the boat puts in; the women, not handsome, but with pleasant kindly faces, wear gaudy blue or red or yellow skirts, with handkerchiefs, mostly white, tied round their heads. All are Russians; it is only in the town of Barnaul, a commercial center to which all the minerals are brought, that one sees now and then an aboriginal nomad from the steppes to the south, over which hills, outliers of the Altai, begin to show themselves.

Photograph from Horace Brodzky

THE FERRY AT IRKUTSK, ON THE RIVER ANGARA, CHIEF OUTLET OF LAKE BAIKAL

In winter traffic is carried over the ice; in summer there is a pontoon-bridge (see illustration on opposite page). When the ice is breaking up and before the pontoon-bridge is swung into position, this ferry-boat is used.

A day and a night from Barnaul brought us late in the evening to Biisk, a place of some importance, to which all the butter coming from the vast pastures which lie all round is brought, and to which timber from the vast mountain forests beyond is floated down the river Biya, which, joined a few miles lower down by the river Katun, issuing from the Altai, forms the Obi. It lies at the edge of the steppe, here rising nearly two hundred feet above the stream, and is a brisk, thriving place, with a good many people of the middle class, traders and government officials.

Through one of the latter (whose tardy action I ought, perhaps, had I better known the "manner of the god of the land," to have accelerated in the proper Russian fashion) I managed to engage a tarantass, the only kind of vehicle for travel that is suited by its structure for the country it has to traverse. It seats four persons (two behind and one beside the driver), has four low wheels, and short poles supporting the low frame, which play, however inadequately, the part of springs in reducing the jolts and shocks of the rough cart tracks, full of stones and holes, which are here called roads. Beside the two horses, a third, running outside, is usually harnessed.

Our party included an interpreter and a police sergeant, told off to accompany us, not for protection, since the region is perfectly safe, but rather to insure our getting horses at the post stations on the way into Mongolia. We set off on Au-

Photograph by Maynard Owen Williams

THE PONTOON-BRIDGE AT IRKUTSK BEING PUT INTO PLACE IN SPRING (SEE ALSO ILLUSTRATION ON OPPOSITE PAGE)

The history of Irkutsk goes back to 1652, when winter quarters were established here by the Russians for the collection of fur taxes from the Buriats (see illustration, page 494).

gust 18, crossing the broad stream of the Biya in a large ferry-boat.

FLOORS OF POST STATIONS BETTER THAN THEIR BEDS

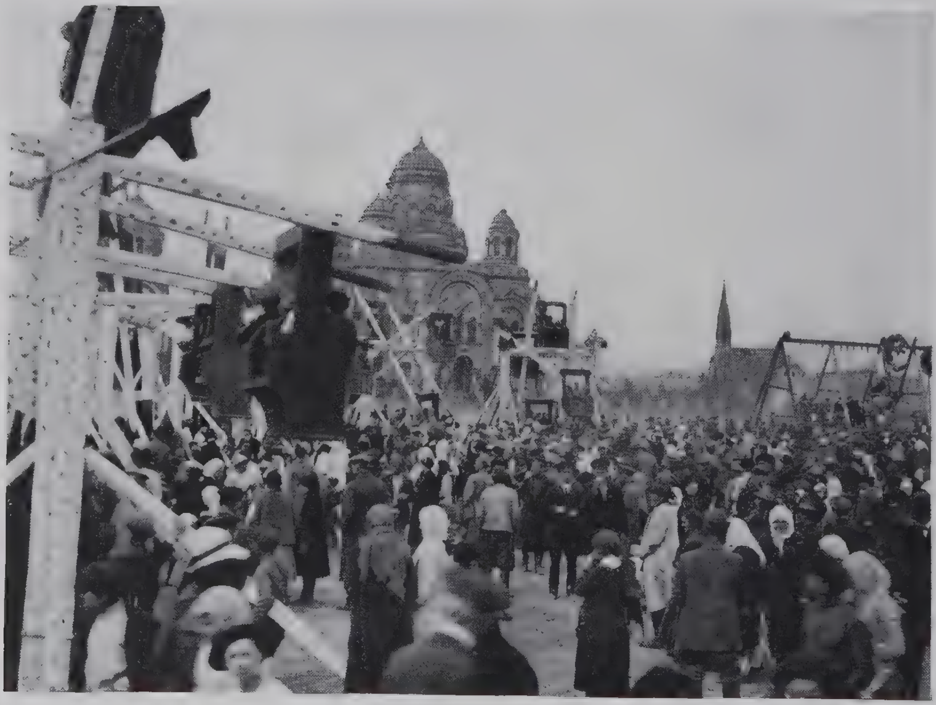
Each post station, which is bound to provide horses for travelers presenting a "Crown Podoroshna," has one or two small rooms reserved for the use of officials and called the Zemstvo Quartier; and passably furnished. There are usually two beds, but into these we never ventured, preferring to sleep on the light mattresses which, according to custom, we carried with us and laid on the floor. After a long day's jolting in the open air one can sleep on the hardest floor.

The people were always civil, and gave us what food they had, black bread, usually butter also, which was always good, and sometimes eggs, but vegetables were never, and meat scarcely ever obtainable. We had brought a tin of biscuits, with a little tea (needless, because it is the beverage of the country) and preserved meat and desiccated soup, the latter always to be recommended whenever hot water can be had.

We started every morning as soon as the horses could be got, and never reached the night's halting place till after dark, yet could seldom cover twenty-five miles a day, for the tarantass cannot, along such tracks, on an average, and allowing for the changing of horses, accomplish more than three or four miles an hour, and we might just as well, and with more pleasure, have journeyed on foot, but for the frequent swamps and occasional downpours of rain. Twenty-five miles is an easy day's walking in exhilarating mountain air, if one has no knapsack to carry.

A LAND OF MARVELOUS FLORAL BEAUTY

The first day's journey was over the rolling grassy steppe; the second brought us into soft valleys between the lower hills, valleys filled with flowers of many brilliant hues, such as one might find on the lower slopes of the Alps in July, for here the snow does not melt away till



Photograph by Maynard Owen Williams

EASTER MERRYMAKING IN THE GREAT SQUARE AT IRKUTSK

Irkutsk is the principal city of Siberia, 3,792 miles by rail east of Petrograd. It is the capital of the government of Irkutsk, which has an area 20,000 square miles greater than that of Texas. The building in the background is the Cathedral of the Virgin of Kazan.

May. They were mostly of west European genera, some of them British species—blue larkspur, columbines, and (if I remember right) the blue Jacob's ladder (*Polemonium*), purple and yellow aconites, campanulas, gentians, and the white grass of Parnassus (a plant widely scattered over the world), the tall pink willow herb, and, in great profusion, one of the most ornamental among British wild flowers, the purplish blue geranium (*Geranium pratense*). Such a wealth of color I have seldom seen.

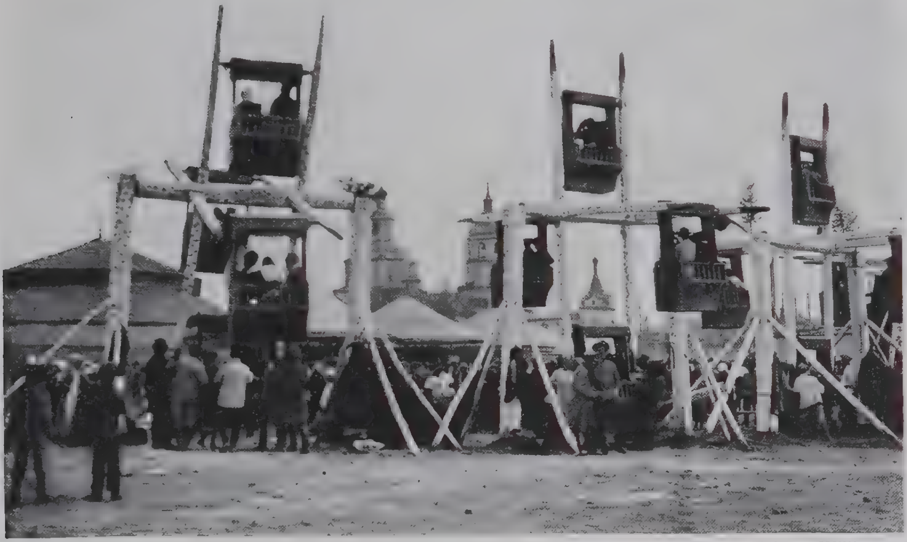
On the third day we reached a charming hollow surrounded by cliffs, whose sheltered situation and pure air have occasionally drawn to it a few visitors threatened with tubercular disease. It would be an excellent spot for a sanatorium if the track were rendered passable for invalids and if there were an inn.

Not far off a Russian landscape painter had made a studio for himself in a hut. He was absent, and as it stood open, we saw the studies of Altaian scenery, which were decidedly clever, though rather hard in color. These were the only signs that met us during the journey to indicate that any one ever comes here from the plains except on official business or for the slender trade in Mongolian wool.

It was a singularly beautiful valley, bold rocks rising out of the forest and the splendidly bright torrent of the Katun sweeping down through pastures gemmed with Alpine flowers.

Desiring only to convey a general impression of the region, I will not attempt to describe the course of our wanderings, nor the difficulties encountered on rocky tracks and along the crumbling edges of deep ravines, nor in plunging through swamps where stones hidden in the mud sometimes all but capsized the luckless vehicle into the water.

Worse still were the risks we ran of being overset in the mire of the track



Photograph by Maynard Owen Williams

FERRIS WHEELS IN IRKUTSK DURING EASTER WEEK

In pre-Bolshevik days Irkutsk was the home of the Siberian branch of the Imperial Russian Geographical Society.

where it led into and through the villages, for here all the space between the houses was a bottomless sea of black farmyard filth, immersion in which would have left the traveler's clothes "a thing to dream of, not to tell."

ALTAI'S LOFTIEST PEAKS ARE AS HIGH AS THE MATTERHORN

All these and many other drawbacks to an Altaian journey are outweighed by the views one gets from the heights, as well as by the wild charm of the woods and the sparkling torrents that foam down the glens. In particular there dwells in my memory one panoramic prospect obtained from the summit of a mountain above the Semenski Pass, a little over three thousand feet high. From it we looked out over an immense stretch of rugged ridges and bare peaks rising one behind another to where in the far southeast snowy summits shone in the sunlight.

The two Belukha peaks (14,900 feet), believed to be the loftiest points in the Altai (about the height of the Matterhorn), were hidden by nearer heights. They are the center of a mass of glaciers, and round them the grandest crags and gorges are to be found.

Those gentler landscapes which we did see were always picturesque and sometimes charming, but not comparable in beauty to the finer parts of the Italian Alps or Pyrenees, or to the valleys of the Sierra Nevada of California, or to the majestic summits of the Caucasus.

Indeed, the Altaian scenery never reminded me of the Alps. It is more like that of the Canadian Rockies, or even perhaps the most secluded glens of the Scottish Highlands, though in the latter everything is, of course, on a much smaller scale.

What one found peculiarly impressive in the Altai was the sense it gave of an untouched primeval wilderness, remoteness and immensity. The very breezes, whistling or moaning through the trees, sound like

> ". . . a wind that shrills
> All night in a waste land where no man
> comes,
> Or hath come, since the making of this
> world."

Civilization seems infinitely far away, for one is in regions where few signs

Photograph by Graham Romeyn Taylor

PEASANT CHILDREN IN A WESTERN SIBERIAN VILLAGE

Photograph from Horace Brodzky

VOLUNTEERS FOR THE WHITE GUARD CAVALRY AT IRKUTSK

"The communist doctrines of the Bolsheviks find no support in Siberia except among the few town workers" (see text, page 499).

Photograph by C. S. Stilwell

ITS HANDSOME RAILWAY STATION IS ONE REASON WHY IRKUTSK IS CALLED THE PARIS OF SIBERIA

"Nothing forbids the hope that the natural action of economic forces will, perhaps within a few years, install some sort of settled government in Siberia, able to enforce order and to permit men to resume their daily work in a normal way" (see text, page 507).

Photograph by Hugh A. Moran

THE IRKUTSK MARKET PLACE

Before the World War 100,000 industrious Russian peasants immigrated to Siberia annually. This is destined to become one of the great food-producing countries of the world.

Photograph by Hugh A. Moran

PEASANTS IN THE REGION OF FORMER PENAL COLONIES IN THE LAKE BAIKAL DISTRICT, SIBERIA

meet the eye to show that man has cared to dwell, or will ever care to dwell, in this wilderness, save to fell the woods and hunt the wild creatures that shelter therein. It is a land not to be thought of in terms of time and space, for in it nothing has ever happened to measure time by, and in space it exists only as the gathering place of the waters that feed the great rivers, as yet receiving nothing from without and as yet producing hardly anything to send elsewhere.

THE KALMUKS DWELL IN CONICAL HUTS MADE OF BARK

From a station on the route into Mongolia we were forced to turn back, for the tarantass, which had been frequently repaired, was pronounced unfit to carry us any farther along a track described as worse than that we had traveled; so it was evidently impossible to reach the central snows of Belukha.

Taking a more westerly track on the return journey, we passed between bare, bold mountains over several high table-lands, in some of which we met nomad Kirghiz, with their herds; in others Kalmuks, dwelling in round conical huts of bark, not unlike the Indian wigwams. The former were Mussulmans of Turkic stock, the latter Buddhist Mongols, but in both there remains much of the old Shamanist spirit worship, which prevailed over all northern and central Asia before the spread from Arabia and from India of the two great religions aforesaid.

The people are wild and unkempt, many of them wearing sheepskins or bearskins, but they are peaceable in aspect and with good, simple faces, not wanting in intelligence. Round the Kalmuk huts birch poles are fixed, from which flutter strips of white linen, apparently meant to ward off evil spirits.

Both races live off their sheep, cattle, and horses, drinking the milk of all three, but loving best the *koumiss*, made of mare's milk, which, when fermented, becomes intoxicating. Sometimes they cultivate a little patch of ground.

KALMUKS AND KIRGHIZ NEVER WALK

A Kalmuk or a Kirghiz never walks; like an Icelander, he jumps on his wiry little horse to go a hundred yards.

On these high plains we saw swarms of little burrowing creatures called tarbaghans, resembling the marmot of the Alps, scurrying to their holes as our vehicle approached, and at a spot where the ground was covered with the Alpine edelweiss (*Gnaphalium leontopodium*) for fully a square mile, we saw a long train of camels stalking over the pasture, a strange juxtaposition of the plant that in

Europe grows beside the glaciers with the denizen of the Arabian desert.

Once we came suddenly on a huge eagle, bigger than the sea eagle of North America or the golden eagle of Europe, sitting on a low rock surrounded by a parliament of crows. He rose very slowly at our approach and sailed deliberately away while the parliament dispersed. He may possibly have been a lammergeier, but did not seem to me quite the same as that splendid bird, which I once saw circling over my head on the top of a peak in the Engadine.

Of hawks and falcons there were plenty, as there are of wolves, bears, and lynxes; but the tiger, though he can stand cold—for he is sometimes seen on the shores of Lake Baikal, and puts on a thick coat of fur in northern Korea—does not in this region come farther north than the marshes of Lake Balkash, some hundreds of miles to the southwest.

Photograph by D. A. Foster

ALONG THE BAIKAL MOUNTAIN SECTION OF THE TRANS-SIBERIAN RAILWAY

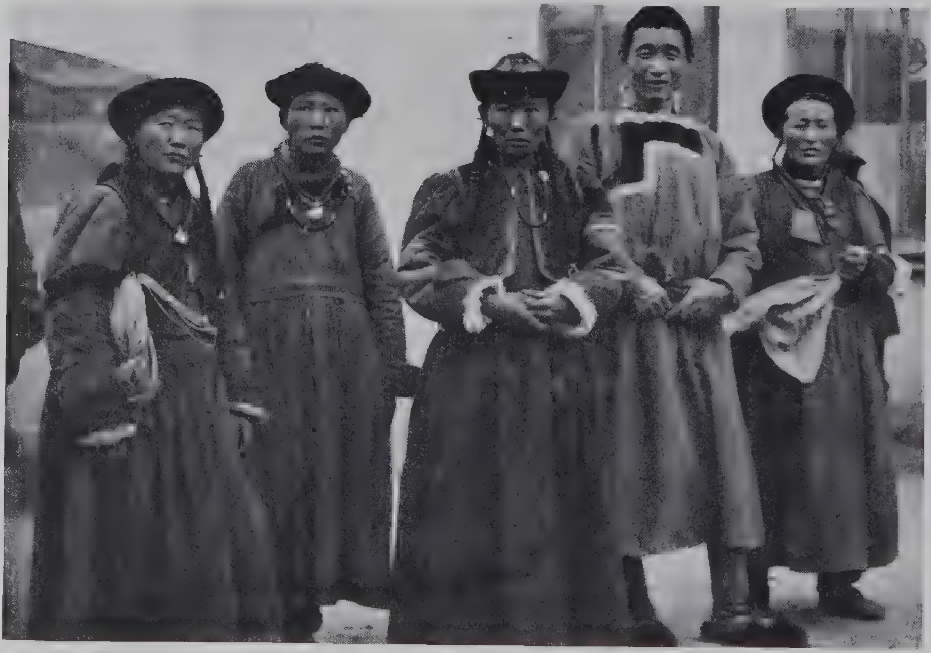
"The line runs for many miles on a shelf cut out of the steep mountain side, with frequent tunnels through projecting cliffs" (see text, page 473).

A few days more through picturesque rocky valleys brought us down to the foothills, and thence over the steppe to the town of Biisk, whence we had started. There, after a farewell view of the mountains from the high bank above the river Biya, we embarked on a steamer even smaller than that which had carried us up.

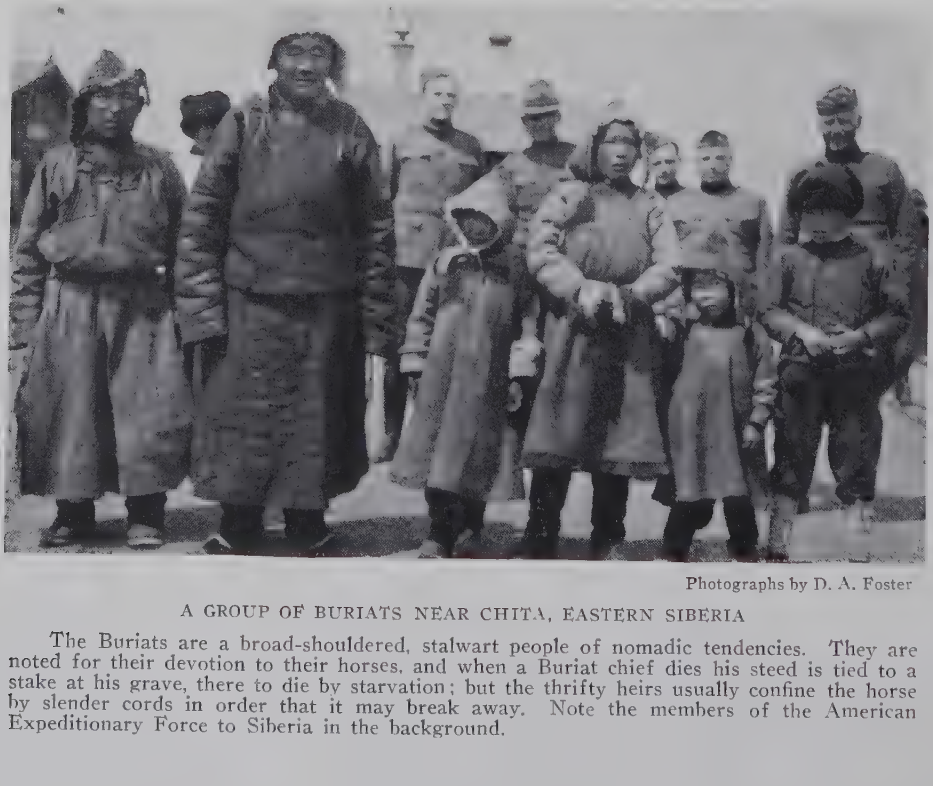
Having now the current of the river to speed our downward course, we came in three days, making a long halt at Barnaul, a dreary place in the dreary hours of rain we had to spend there, back to Novo Nikolaevsk, where we were hospitably entertained by the representatives of the great American firm which supplies agricultural machinery to half the Russian world.

THE ALTAI MOUNTAINS AS A POSSIBLE PLAYGROUND OF ASIA

Here we rejoined the railway; here we boarded the train which was to carry us to Omsk and through the Urals to Moscow and Petersburg (Petrograd), and Königsburg, ancient capital of the Teutonic Knights; and so on to Berlin, where, ten months before the fatal days of July, 1914, we were told (and, as I



A BURIAT MAN AND FOUR WOMEN ASSOCIATES



Photographs by D. A. Foster

A GROUP OF BURIATS NEAR CHITA, EASTERN SIBERIA

The Buriats are a broad-shouldered, stalwart people of nomadic tendencies. They are noted for their devotion to their horses, and when a Buriat chief dies his steed is tied to a stake at his grave, there to die by starvation; but the thrifty heirs usually confine the horse by slender cords in order that it may break away. Note the members of the American Expeditionary Force to Siberia in the background.

believe, honestly told) by a high official of the Foreign Office, that the diplomatic relations between Germany and England had been steadily improving.

Whether the Altai will ever become the mountain playground of Asia, as Leslie Stephen called the Alps the playground of Europe, may be doubted, for the Altaian landscapes, varied and charming as they are, and sternly grand as is the high glacier region, have not the more exquisite charm and the more inexhaustible variety of the Swiss and Italian Alps. But they and the lofty ridges that continue the great line of elevation as far as the river Amur are the only Asiatic ranges in which mountaineering can be enjoyed as we enjoy it in Europe or as Americans enjoy it in the Sierra Nevada and Rocky Mountains.

The Himalayas are incomparably grander, but there the summers are wet and intensely hot, and both the heights and the valleys are on a scale too vast for average human powers. To cross one single gorge like that of the Teesta below Darjeeling, descending 7,000 feet, and mounting another 7,000 to the opposite edge, is work enough for a long day under an Indian sun.

Nevertheless, less interesting as are the Altai, there will some day be much delightful exploration; and some fine climbing will be done in the thousand miles of lofty Siberian mountains, east of the 85th meridian of east longitude. Doubtless, American and Canadian, as well as British climbers, will be found to do it.

Hunters, also, will come, and for a time at least they will find a fair number of wild creatures to destroy—deer, though scarce any elk, as well as wolves and bears and lynxes, and the ibex that haunts the high crags, and in some spots on the Mongolian side of the range, the rare mountain sheep (*Ovis ammon*) with the great curved horns, a creature which, it is to be hoped, they will not be allowed to extirpate.

Though disappointed, owing to the difficulty of making the preparations requisite, at not having been able to make an effective reconnaissance of the approaches to the great peaks, we returned to civilization—half famished, indeed, but sound in health—with the satisfaction of having seen new and most interesting aspects of nature and having caught glimpses of the life of ancient nomad races.

From Siberia we carried back the recollection of a land of large, free, breezy, sunlit spaces, beautiful in summer, with a glorious abundance of flowers, and the impression of a people more cheerful and prosperous than we had expected to find in a country hitherto associated with the cruelties of a tyrannical government and the sorrows of lifelong exile.

THE ECONOMIC FUTURE OF SIBERIA

Something must now be said of the economic future of Siberia, a subject that will become of high significance to the world, for the country contains the one hitherto imperfectly developed region in the temperate zones that has the greatest possibilities of future development for the production of food.

Omitting the districts in eastern Siberia, comparatively small districts, that are fit for agriculture, and omitting, also, the larger and more fertile regions along the river Amur, which Russia acquired seventy years ago, there are between the Urals and the river Yenisei thousands of square miles available either for pasture or for cultivation.

Into this region there had been flowing, mostly from central Russia, a steady stream, averaging 100,000 per annum, of industrious peasants, to whom the government gave farms. Though there were some large estates, Siberia has been, broadly speaking, a land of occupying farmers, very ignorant and living very rudely, but intelligent and laborious.

The cultivated area was being steadily extended, and beyond it, especially along the Obi and the middle course of the Irtish, the rich pastures were supporting an increasing number of cattle, so that an immense trade in butter had sprung up. Most of it was bought by Danish merchants and dispatched in refrigerating cars to western Europe, to be there sold as Danish butter.

Thus, in 1913, the country was thriving, with every prospect of a rapid growth in wealth and population. There were few manufacturing industries, but the minerals hidden in the long mountain

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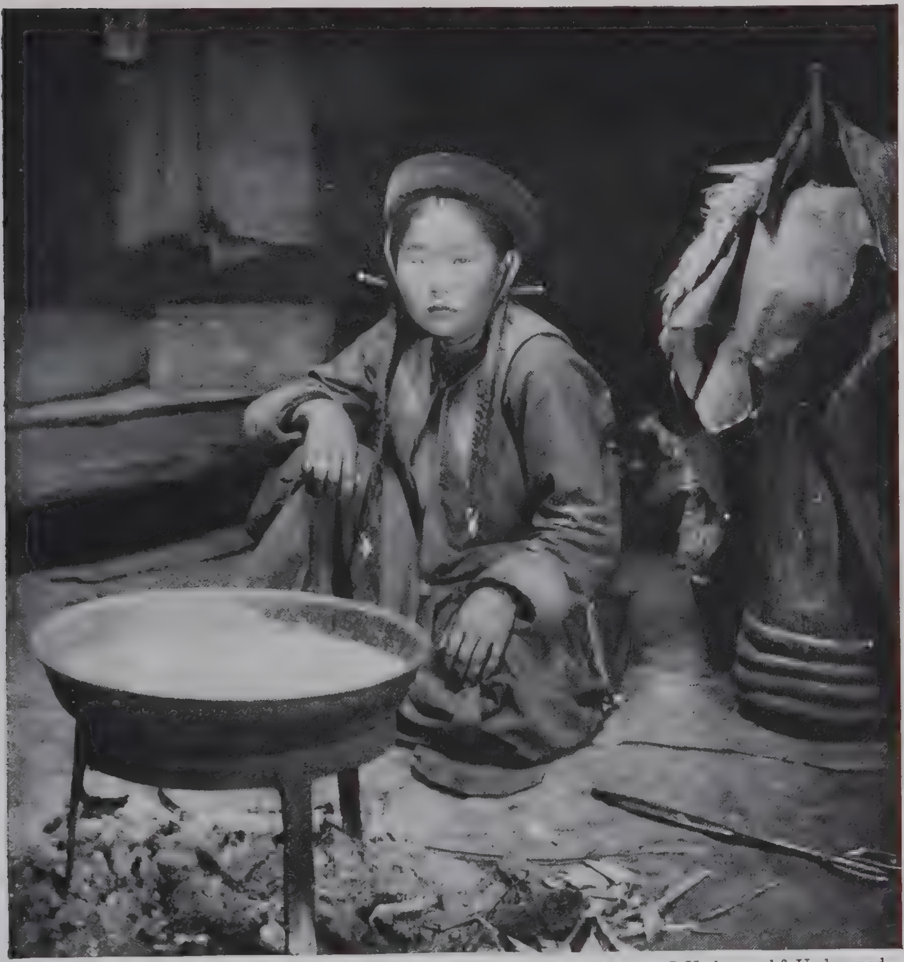
A STREET SCENE IN VERKHNE-UDINSK, 300 MILES EAST OF IRKUTSK

This prettily situated town is the headquarters of the Western Trans-Baikal mining administration. It is the junction point of the two great highways of northern Asia. Southward stretches the road to Kyakhta, to Urga (the capital of Mongolia), and to Peking.

range that divides Siberia from Mongolia are believed to be of immense value. That they had not been better ascertained and exploited, and that all the resources of the country had not been more swiftly developed, was attributed to the incompetence and, above all, to the corruption of the imperial administration—a deeply rooted evil, which neither well-meaning emperors nor an energetic minister, if one now and then appeared, had been able to cure.

Had Siberia been in the hands of Americans or Canadians from 1870 to 1910, its revenues and population would have been double what they were in the latter year, for the internal river communications would have been improved and the railway tracks into European Russia would have been duplicated or triplicated.

In 1913 men were discussing one expedient for increasing the trade of the country which a more enterprising government would have done its best to



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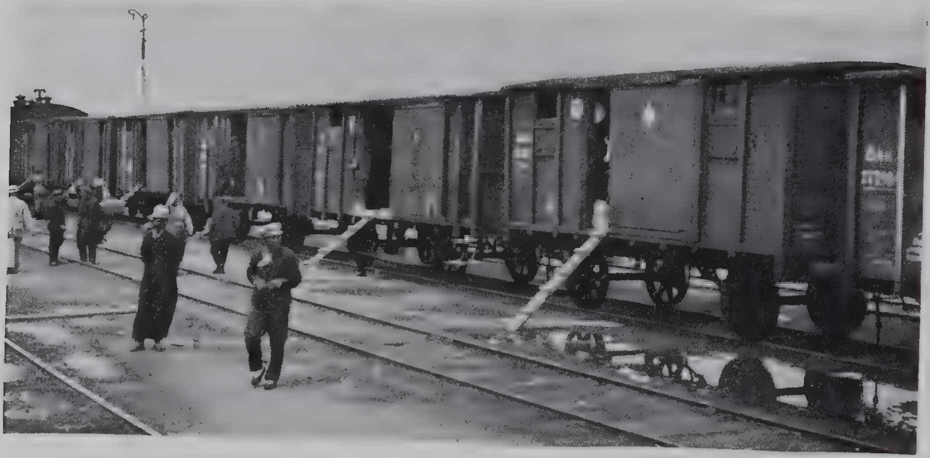
A TUNGUSIAN GIRL OF EASTERN SIBERIA

The Tunguses are at home throughout central and eastern Siberia, from the Yenisei River to the Pacific. Broad, flat features, with small nose, thin lips, and dark, oblique eyes, are characteristic of this Mongol-Tatar people. They are a cheerful, brave, self-reliant, modest, and hospitable race of hunters, making their home chiefly in the midst of dense forests.

favor. The greatest want of Siberia is cheaper transportation for its heavy products to European markets, especially to those of Germany, France, and England, and that which most reduces the value of its great rivers as freight carriers is the fact that their mouths in the Arctic Ocean are difficult of approach, even in summer, because vessels may get caught in the Kara Sea east of Novaya Zemlya, and even if they reach the Gulf of Ob (Obi), may be unable to return with the cargoes they have loaded.

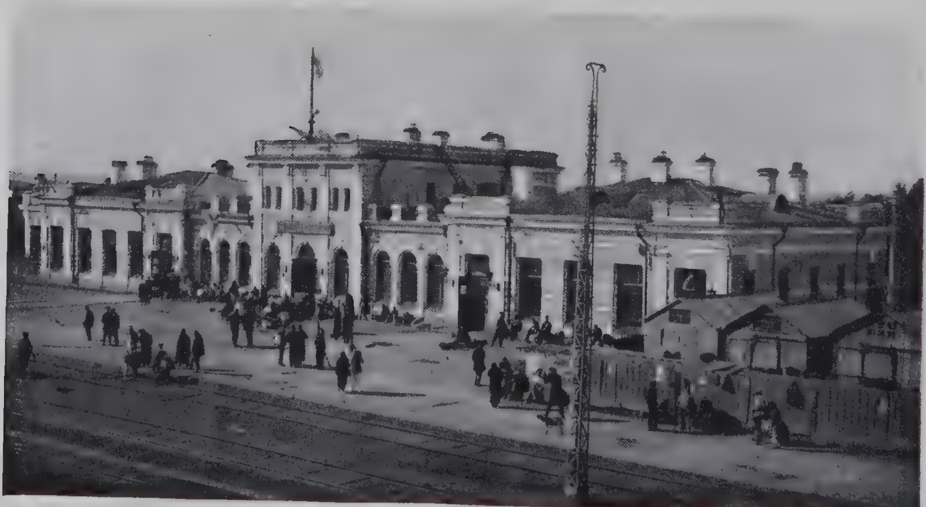
The employment of wireless telegraphy may be expected to immensely reduce this risk, for by means of it approaching or departing ships could be kept informed from various points regarding those parts of the sea which may be open—and there are always such parts in July and August—and their course could be directed accordingly.



Photograph by C. S. Stilwell

A TRANS-SIBERIAN TRAIN DE LUXE IN WAR TIME: NOTE THE MEANS OF INGRESS TO THE BOX-CARS

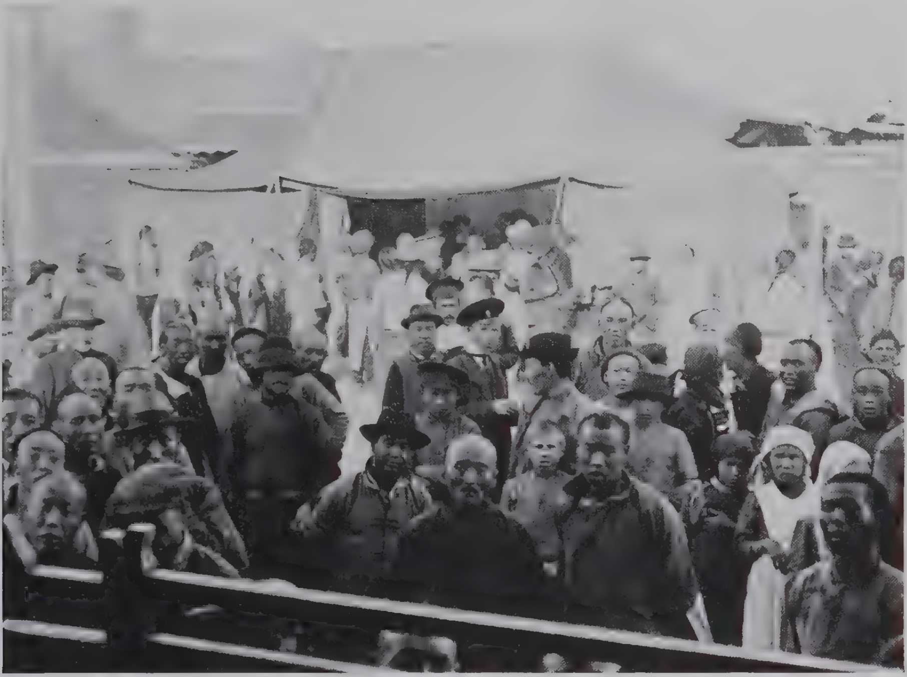
The total length of the Trans-Siberian Railway with its branches is more than 5,400 miles, including the more than 1,000 miles in Chinese territory. It was begun in 1891 and virtually completed by 1902, the total cost being estimated at more than $435,000,000. It is the one great factor in the social and economic life of the country which those who wish to understand Siberia must keep always in mind.



Photograph by D. A. Foster

THE CHINESE EASTERN RAILWAY STATION AT NIKOLSK USSURIISKII

Nikolsk Ussuriiskii is a town of 50,000 inhabitants, sixty miles northwest of Vladivostok. In peace times it was a popular resort for sportsmen seeking musk-deer and wild boar.



Photograph from Horace Brodzky

A CROWD IN FRONT OF AN OPEN-AIR THEATER AT A CHINESE FAIR IN KYAKHTA, SIBERIA

The crowd contains Chinese, Mongolians, Russians, Tatars, Buriats, and a few Europeans. There is no scenery at these shows. The "announcer" tells the spectators what scene they must imagine. The costumes of the actors, however, are very beautiful, elaborate, and costly.

As far back as the days of the Tsar Ivan the Terrible and the English Queen Elizabeth, a bold English captain tried this route with success, and there is reason to believe that nowadays vessels fitted with wireless apparatus could make pretty sure of safe voyages to and fro.

NOT A FERTILE FIELD FOR BOLSHEVIK DOCTRINES

The economic progress I saw in 1913 was arrested by the war which broke out in Europe just a year later; and in 1917 there was fighting in Siberia itself between the Bolsheviks, who had then seized power in European Russia, and their opponents, who were organized for a time under Admiral Kolchak.* The Bolsheviks prevailed, not because the Siberian peasants adopted communist doctrines, for those doctrines find no support in Siberia except among the few town workers, but because the men who surrounded the unfortunate and entirely well-meaning Kolchak made themselves detested; so that his forces, at first successful, ultimately melted away before the Bolshevik advance with very little resistance.

What is happening in Siberia as I write these lines, in January, 1921, few people in western Europe know, and I am not one of them, but evidently the economic conditions must have gone sadly back since 1913. When will progress be resumed? When will the setting up of a stable and tolerably enlightened government make progress possible?

No sensible man will venture to prophesy about Russia; but one thing at least may be said: In the long run, eco-

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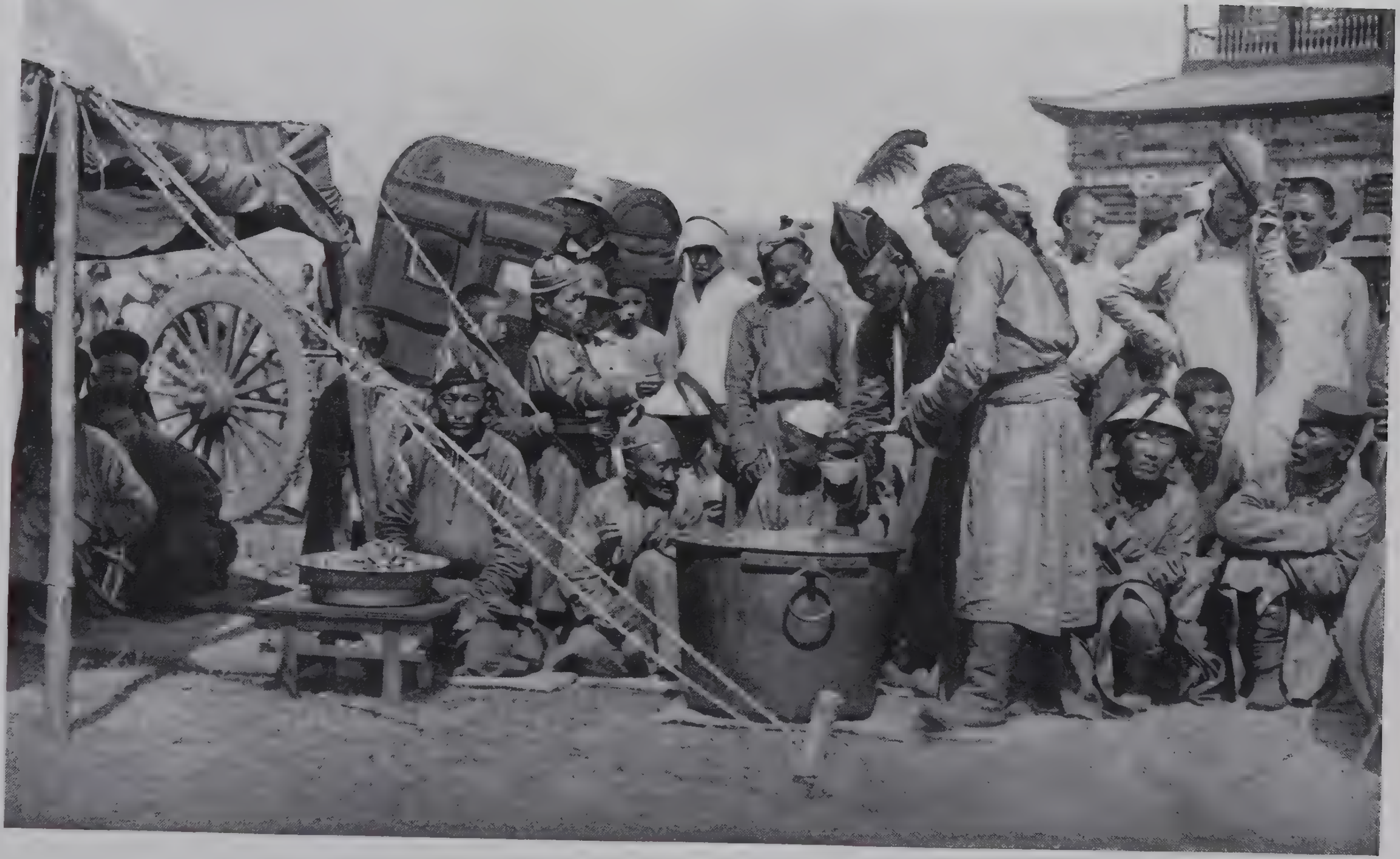
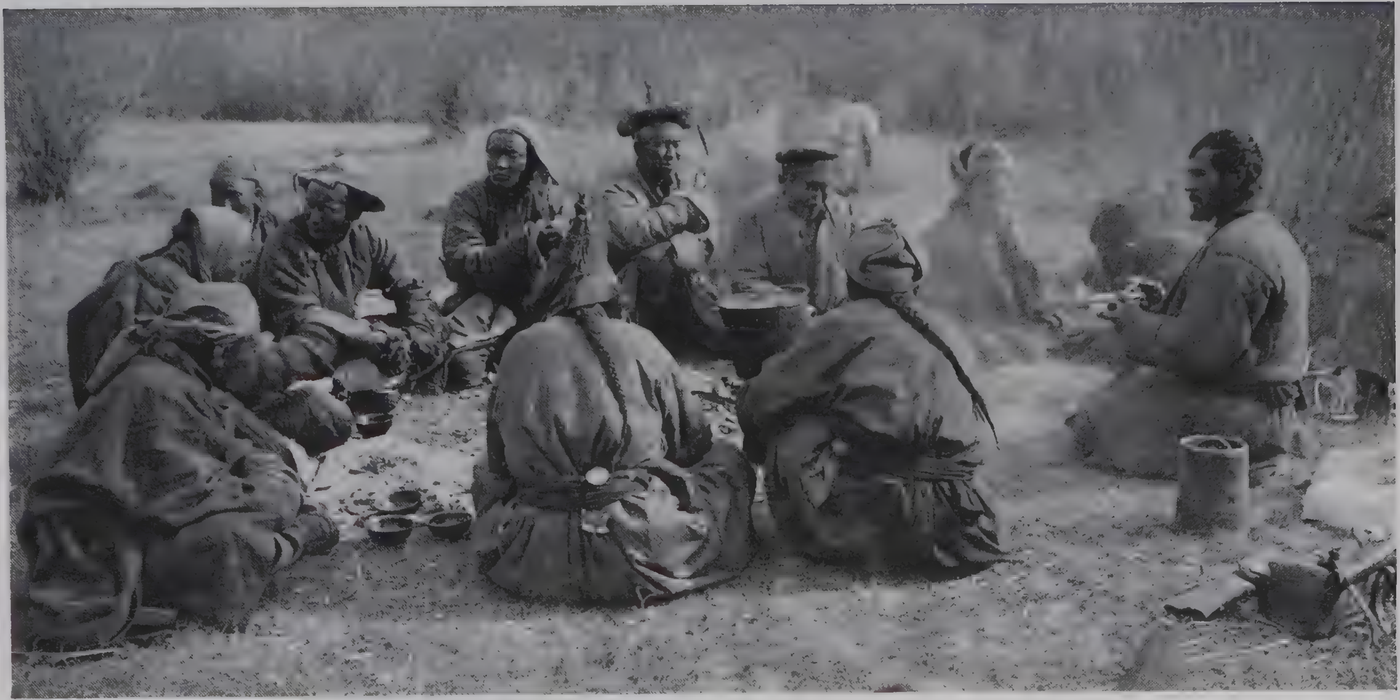
* See "Glimpses of Siberia, Russia's Wild East," in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1920.



Photograph from Horace Brodzky

THE "HOT-DOG MAN" AT A MONGOLIAN FAIR, AT KYAKHTA, ON THE SIBERIAN-CHINESE BORDER

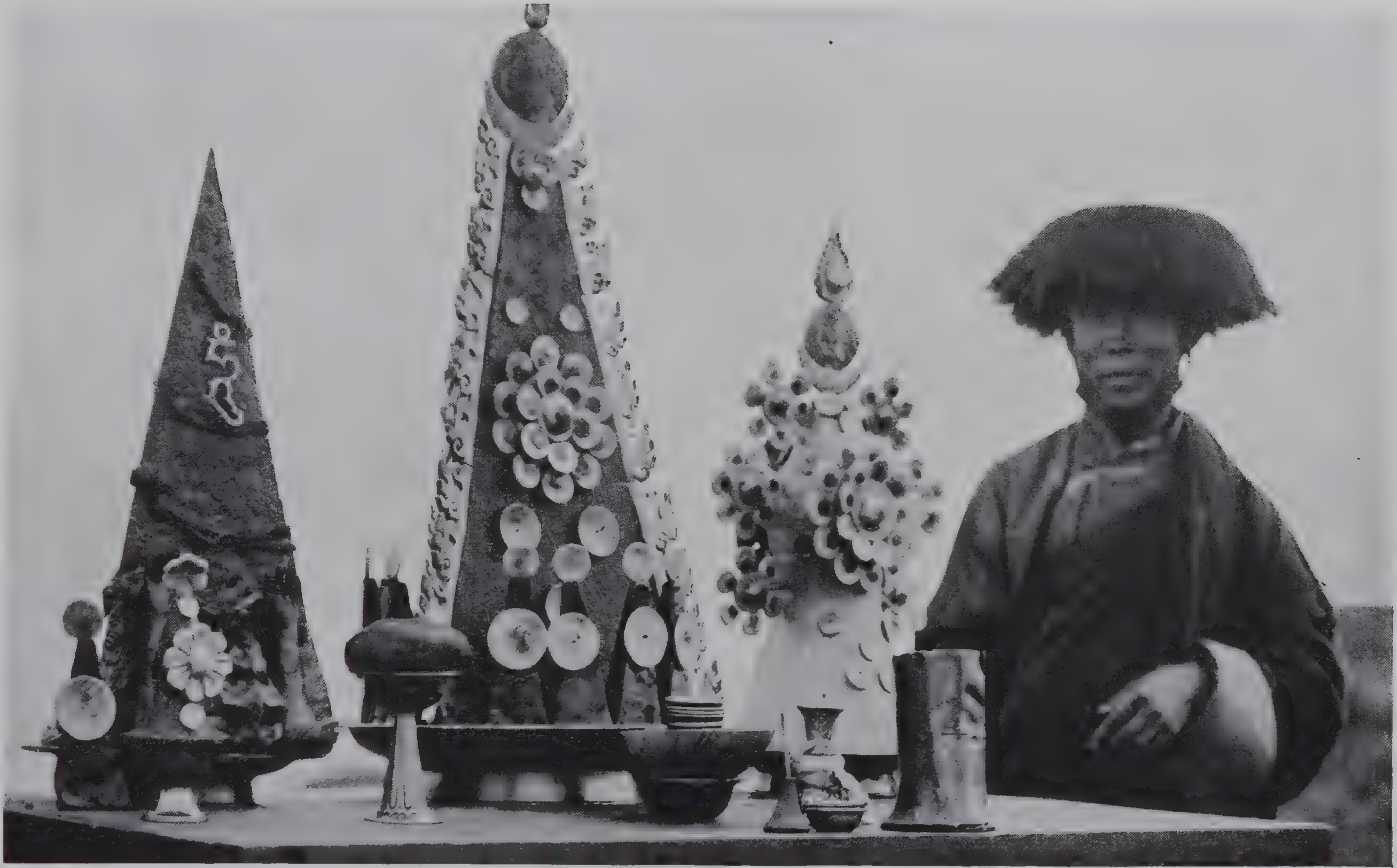
Note the oddly notched rim of the cart-wheel in the left background—ancestor of our modern non-skid tires. Kyakhta was for many years the great emporium for the caravan trade between Russia and China. The completion of the Suez Canal and the construction of the Trans-Siberian Railway robbed it of its importance. Over the border, on the Chinese side, is the town of Maimatshin.



Photograph from Horace Brodzky

MONGOLIANS AT MEAL-TIME ON THE STEPPES OF SIBERIA

The man on the right is a Russian. The chief item on this menu is boiled meat. A Mongolian never eats bread and seldom vegetables. He drinks the soup from the boiled meat and then lifts out a chunk of flesh, holds one end in his mouth and cuts off a piece with his big knife. A Mongolian eats only once a day, at noon or in the evening, when he consumes from five to ten pounds of mutton or beef. In the winter he carries the meat under his saddle, which keeps it from freezing.



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SACRED BREAD: SIBERIA

The greatest feast in the Russian year is Easter. Religious ceremonies are held in the churches lasting several hours after midnight and terminating with the curious ceremony of blessing the Easter cakes. Instead of the customary cross, the bread shown in the illustration is capped with the Mohammedan symbols of moon, sun, and flame.

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A SHAMAN FEAST : SIBERIA

Shamanism is the primitive religion of certain tribes in Siberia, but in most cases practiced under an outward show of newly introduced religions, either Christian, Buddhist, or Mohammedan.

Photograph by Hugh A. Moran

THE LAST EXPRESS TRAIN TO GO THROUGH FROM VLADIVOSTOK TO PETROGRAD IN FEBRUARY, 1918: BAIKAL, SIBERIA

nomic factors are sure to prevail. They assert themselves, because revolutionary disorders never last very long, since it is the general interest of the vast majority in every people to see a stable administration established; and when some strong man, or group of men, possessing the gift for rule have established it, the self-interest of the rulers prompts them to occupy the energies and promote the well-being of their subjects by extending facilities for trade and industry.

SIBERIA'S HISTORY IS ALMOST A BLANK

A few concluding words may be said as to the future generally. The history of Siberia was almost a blank, and had little interest for the world at large, till 1917. The men of Great Novgorod had occasionally sent trading or raiding bands across the Urals in the eleventh and twelfth centuries, and the first invasion was under a robber chief, named Yermak, who led his followers into the country in 1580. But thereafter the process of conquest and colonization went on unnoticed by Europe, with no serious resistance from the aboriginal inhabitants, who were weak and loosely scattered savage tribes.

Thus there were really no events for historians to record; the process went on gradually and unobserved. The racial character of the Russian immigrants has (except in the Far East) been scarcely affected by any infusion of aboriginal blood, and so far as the Siberian Russians differ from the Russians of Europe, they are nowise inferior.

Serfdom never existed in Siberia. The immigrants were mostly more enterprising than their brethren who stayed at home. The exiles, banished for political offenses, real or alleged, often came from the intellectual élite of Russia, while the descendants of criminal convicts did not permanently stain the population, although some of those who escaped used to range the country as robbers.

Taken as a whole, the Siberians, if not fit to work democratic institutions, are quite as capable of local self-government as are the peasantry of European Russia and just as unlikely to become Communists of the Marxian or any other stripe.

WILL SIBERIA REMAIN A PART OF RUSSIA?

So far as I could learn, the only class in which political discontent or any signs of an interest in politics existed had been the students in the university, who occasionally "demonstrated" or "struck work" when some particularly offensive piece of tyranny proceeded from the university authorities acting at the instance of the ecclesiastic authorities. There have been ferments among the students everywhere in Russia for the last half century; and now and then professors have been dismissed or exiled.

Photograph by Maynard Owen Williams

THE SPIRIT OF SIBERIA

Yellow sunset and boundless expanse of fine country, in the midst of which a raging forest fire is sending up a wisp of smoke more than twenty miles away. The photograph was taken from a swiftly moving train.

Whether Siberia will remain politically a part of Russia, it is impossible to predict. An able English observer, who traveled there forty years ago (the late Mr. Ashton Dilke), told me he thought Siberia would break away, peaceably or otherwise; but nothing I could learn in the country confirmed that forecast.

The Transcontinental Railroad has become a bond of union, and the Ural Mountains, though they would form a good natural boundary if the peoples living on each side differed in race, speech, and religion, do not, the facts being what they are, constitute a barrier worth regarding.

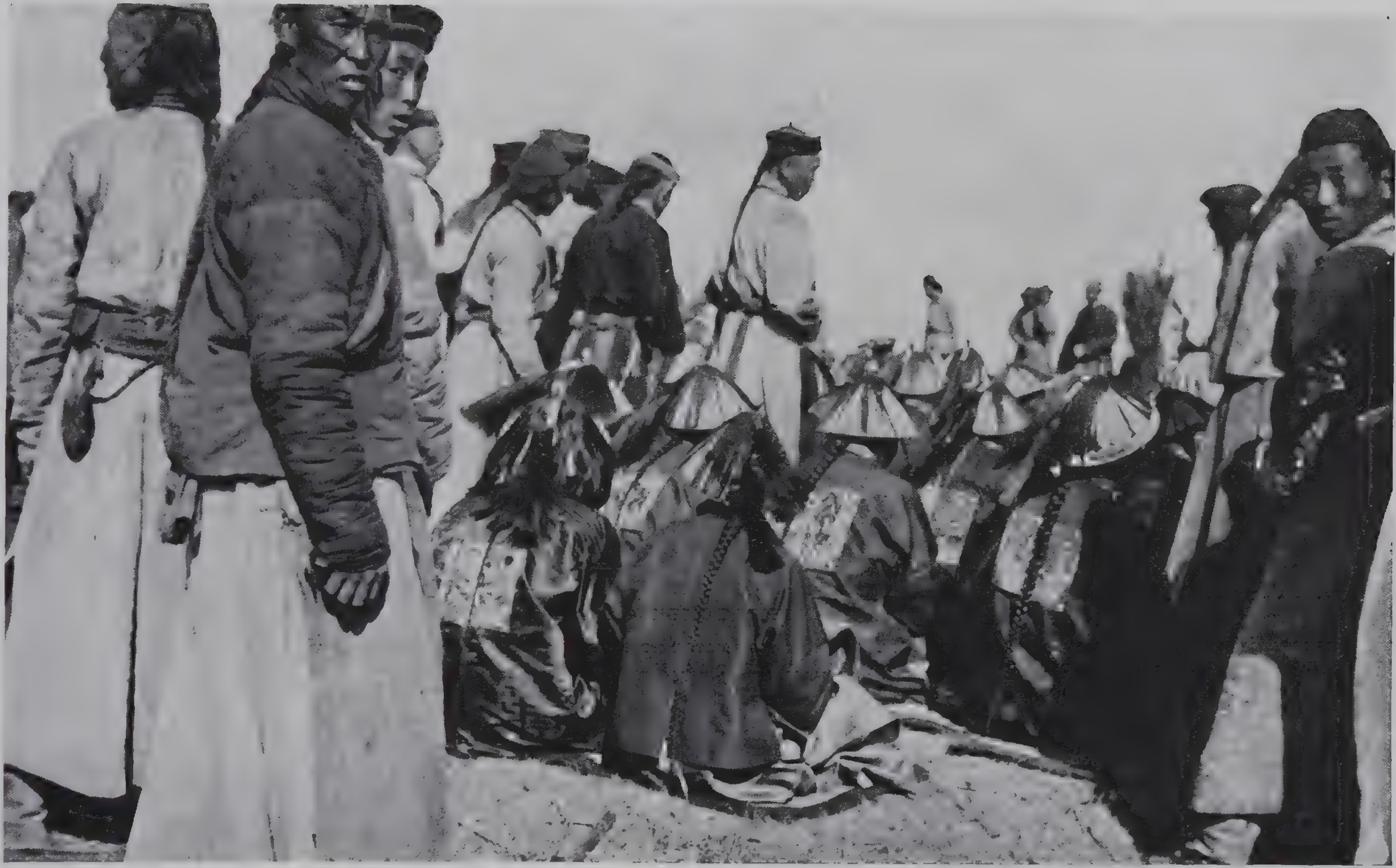
It is much to be wished that they were such a dividing line, for the Russian Empire before 1914 was an unwieldly mass, too big for any one set of men to govern, even had such men been more capable than any Russian ministry has ever been.

Yet in 1913 the Russian Government, moved by that insane impulse which induces states to extend territories already too large, was trying to establish political control over Mongolia as far as the frontiers of China.

The portentous expansion of Russian dominion and the growth of Russian population had become a danger to the world. It was a danger much reduced by the stupidity and corruption of the government, but if a malign fate had set a genius like Frederick the Great or Napoleon on the throne of the Tsars, things might have gone ill for Europe.

PERHAPS A UNITED STATES OF SIBERIA

For its own sake, as well as for the world's sake, it is much to be desired that Siberia as well as Transcaucasia should be disjoined from Russia; and if the inhabitants of Siberia were capable of working a system of federal govern-



Photograph by Eugene Lee Stewart

MONGOLIAN OFFICIALS SEATED BEFORE LAMAS WHO ARE CONDUCTING A RELIGIOUS CEREMONY

Ordinarily the queue is concealed under the hat, but it must be let down while religious ceremonies are in progress.

ment, such a system, consisting of five or six federated states between the Urals and the Pacific, would be better than one huge unitary empire or republic.

What sort of political future may this or the next generation expect to see?

Neither Russia nor Siberia is likely to enjoy free popular constitutional government within any period which conjecture can now assign. But neither is it likely that the economically ruinous despotism which now rules both countries will long endure, or that the incompetent despotism of the Tsars will return.

There may be a time of strife, for the habit of obedience has been broken, and there is now no legally constituted authority for the citizen to obey. But anarchy never lasts long.

Nothing forbids the hope that the natural action of economic forces will, perhaps within a few years, install some sort of settled government, able to enforce order and to permit men to resume their daily work in a normal way.

So soon as Siberia obtains such a government, her economic resources and the industry of her people will enable material progress to start afresh, and she will some day become what western America became fifty years ago and Argentina became thirty years ago—one of the great food-producing countries of the world.

THE PEOPLE OF THE WILDERNESS

The Mongols, Once the Terror of All Christendom, Now a Primitive, Harmless Nomad Race

By Adam Warwick

The cancellation of Mongolian autonomy by China in November, 1919, and the subsequent trouble at Urga, their capital, have once more drawn attention to the "People of the Wilderness," as the Chinese, with thinly veiled contempt for all who dwell beyond the borders of their own civilization, call their neighbors, the Mongols.

Mongolia is a land with a great past. Seven hundred years ago Genghiz Khan set out from its barren steppes to conquer the world, and swept all before him from the Yellow Sea to the Adriatic. Dazzled though we may be by the magnitude of modern warfare, we stand aghast at the unexampled record of his hundred thousand horsemen, who made a three days' victorious march across a hostile land from the Carpathians to Budapest, with minor expeditions deep into Bohemia, Germany, and Serbia.

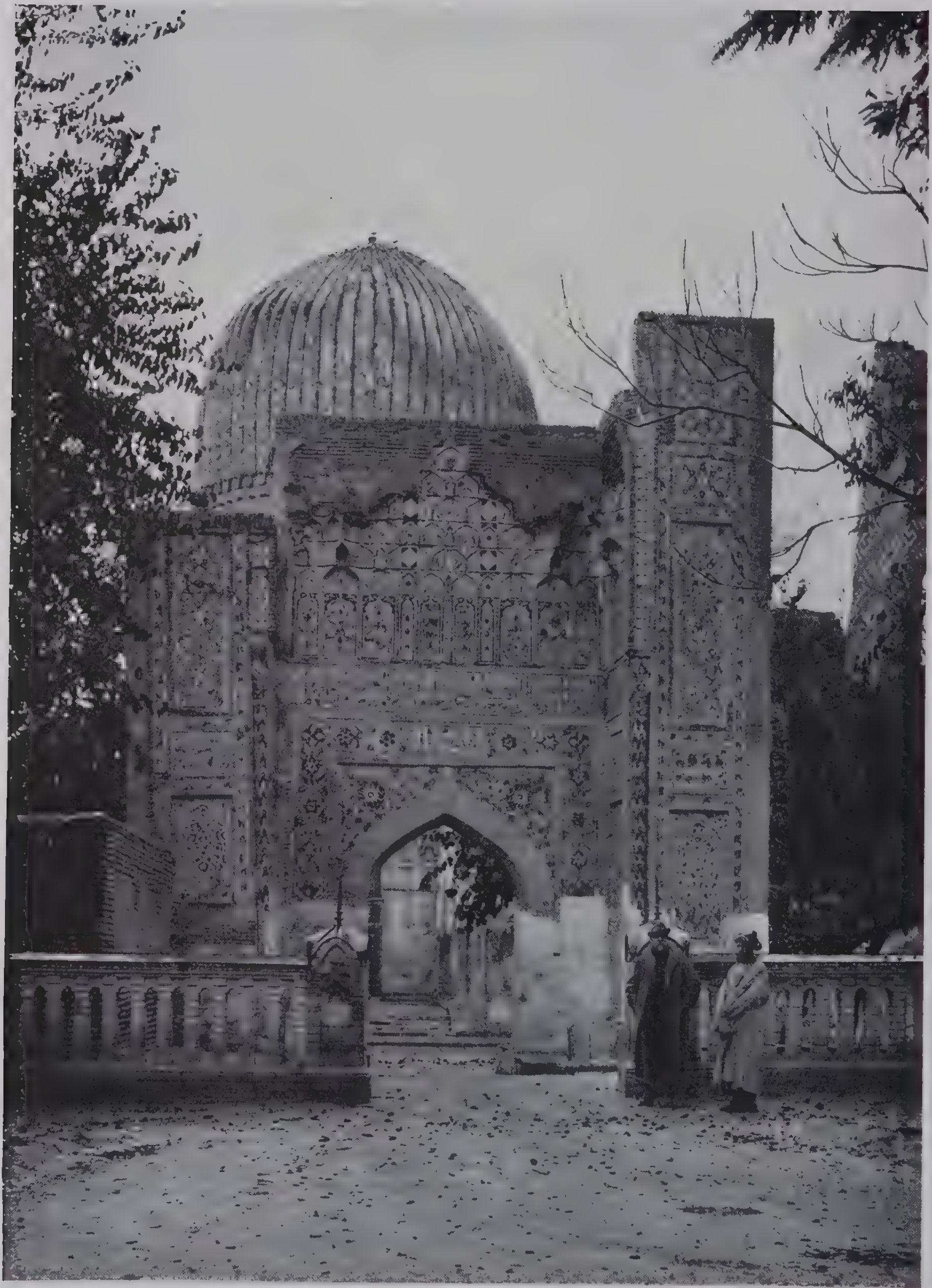
ALL CHRISTENDOM FEARED THE TATAR CHIEF

In those stirring times the world so feared the Great Captain that a special prayer, "Save us from the fury of the Tatars," was introduced into the Christian litany.

It was no idle dread. But for the death of his successor, which imposed three years of mourning and inactivity on the troops, the Mongol forces could not have been stopped by any earthly power until they had reached the limit of the continent of Europe.

Forty years after the disappearance of the Mighty Conqueror (1227), a grandson, Kublai, crowned his triumphs by becoming, not only the master, but the enlightened, magnificent monarch of the whole of China, Indo-China, Burma, Korea, Borneo, and Sumatra. Unfortunately for his dynasty, the settled life of ease and luxury in Peking sapped the vigor of his followers in a single century.

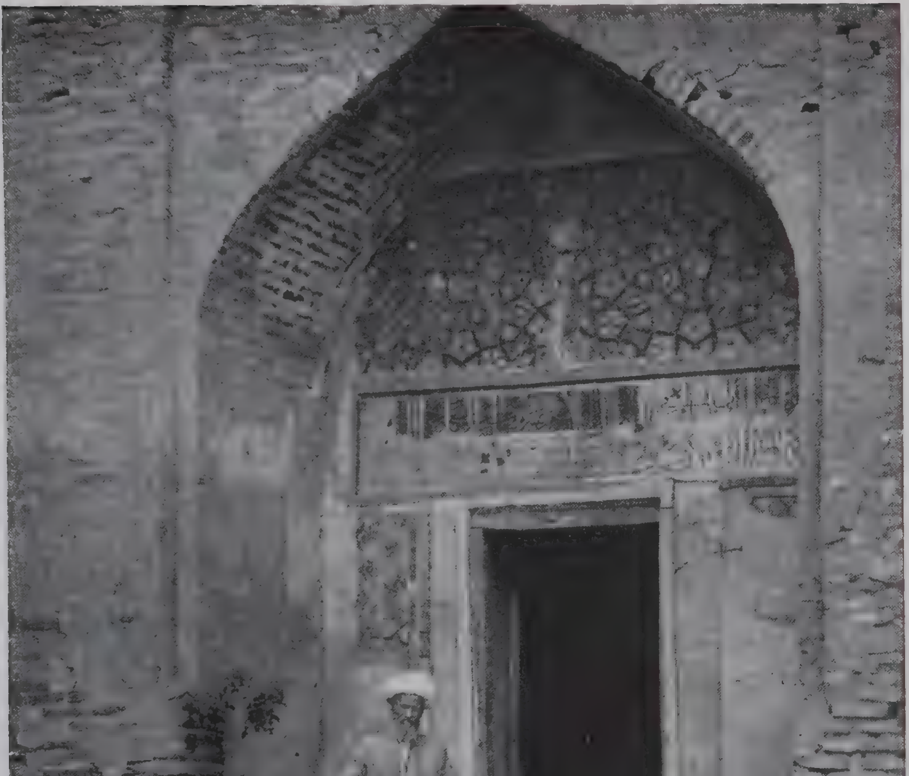
One more great leader was to appear among them in the person of Timur the Lame (Tamerlane), born to subdue Iran and Turan, defeat the growing power of the Turks, and fire Moscow, thus blazing the way for his last descendant, the kindly knight-errant and poet, Sultan Baber, to found the Empire of the Great Mogul.



Photograph by John B. Rogers

THE TOMB OF TIMUR THE LAME (TAMERLANE) AT SAMARKAND, RUSSIAN TURKESTAN

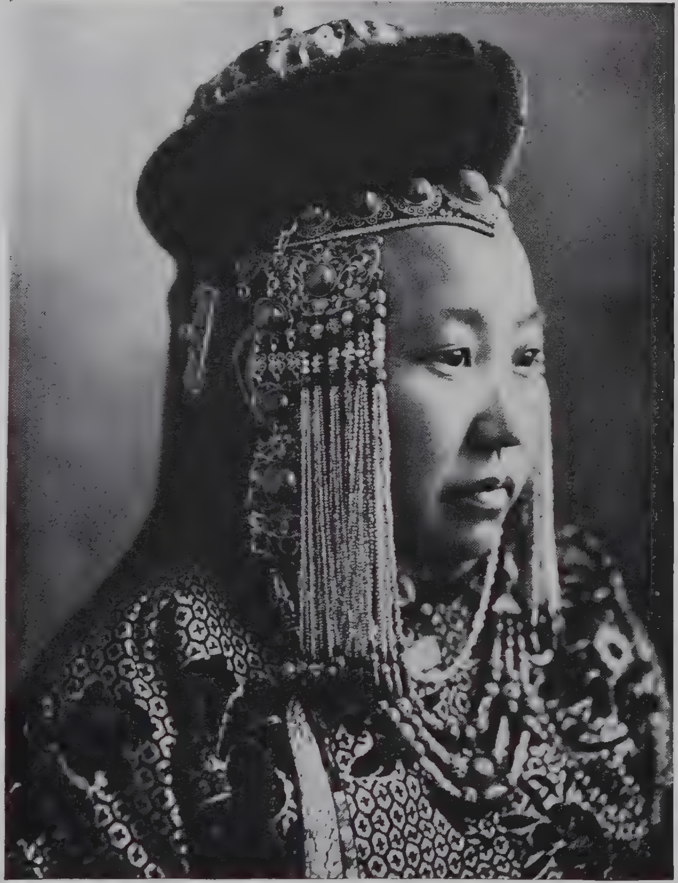
The body of this renowned oriental conqueror, who died in 1405, was embalmed with musk and rose water, wrapped in linen, laid in an ebony coffin, and sent to Samarkand, where it was placed in a sarcophagus of jasper. The tomb consists of a chapel crowned with a dome. Both time and earthquakes have left their mark on the structure, but the interior is still beautiful with turquoise arabesques and inscriptions in gold.

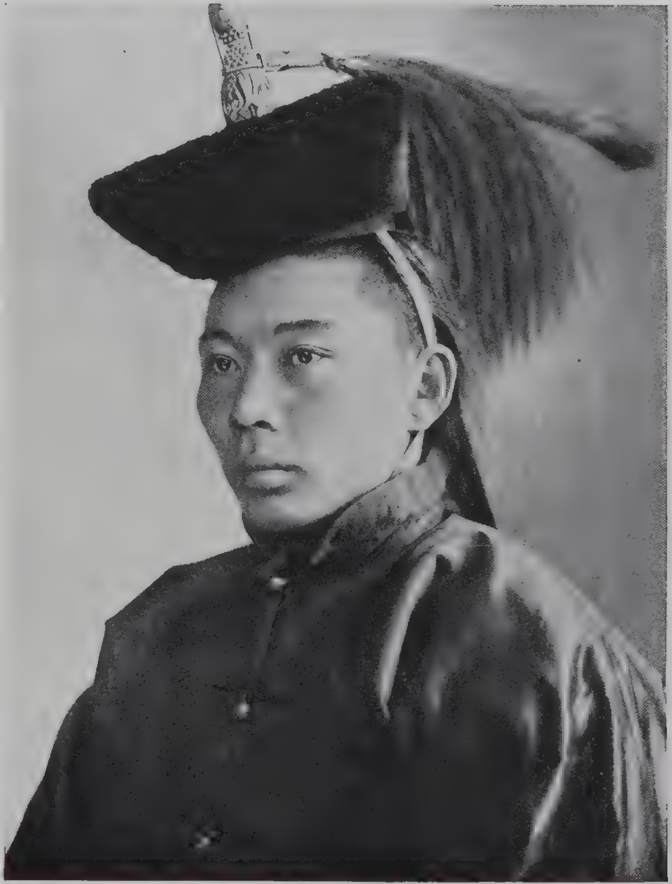


Photograph by Graham Romeyn Taylor

THE DOOR TO THE TOMB OF TIMUR THE LAME

The Mongol leader has been variously painted by his biographers. To some he seems merely "a deformed and impious person of low breed and detestable principles"; to others, a sort of demi-demon, like Richard III. The magnificent but now crumbling summer palace, mosques, and colleges in his capital city of Samarkand bear witness to the fact, however, that Timur and his immediate successors were splendid patrons of architecture.



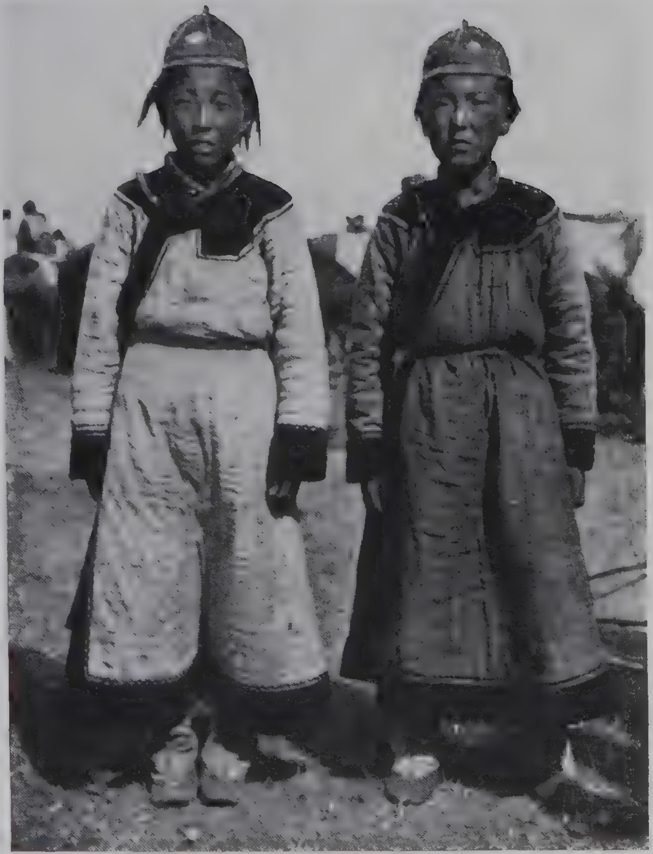


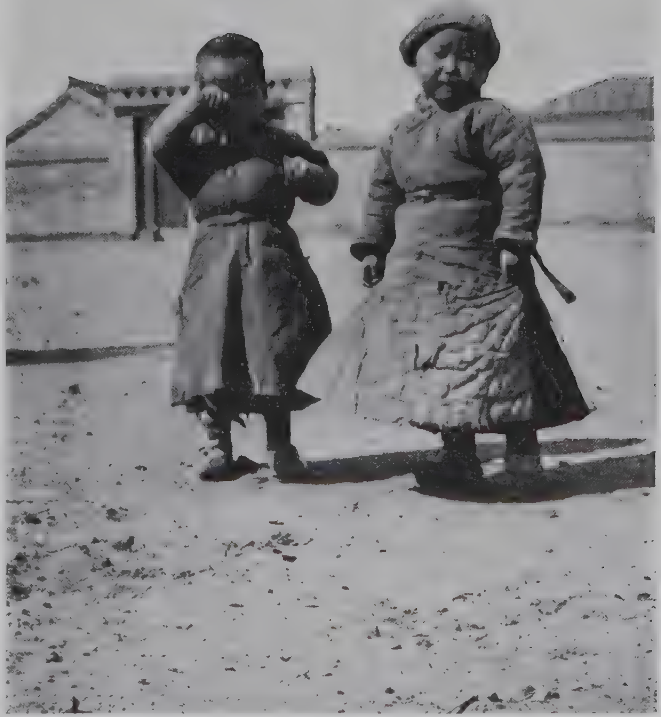
Photographs by Adam Warwick

A MONGOL PRINCESS IN FULL COURT DRESS

A MONGOL PRINCE, DESCENDANT OF GENGHIZ KHAN

They are the scions of a race of conquerors who for a short time struck terror to the hearts of Christendom. Only a custom which required the hordes to observe a mourning period of three years following the death of their leader saved Europe from a Mongol inundation during the first half of the thirteenth century.





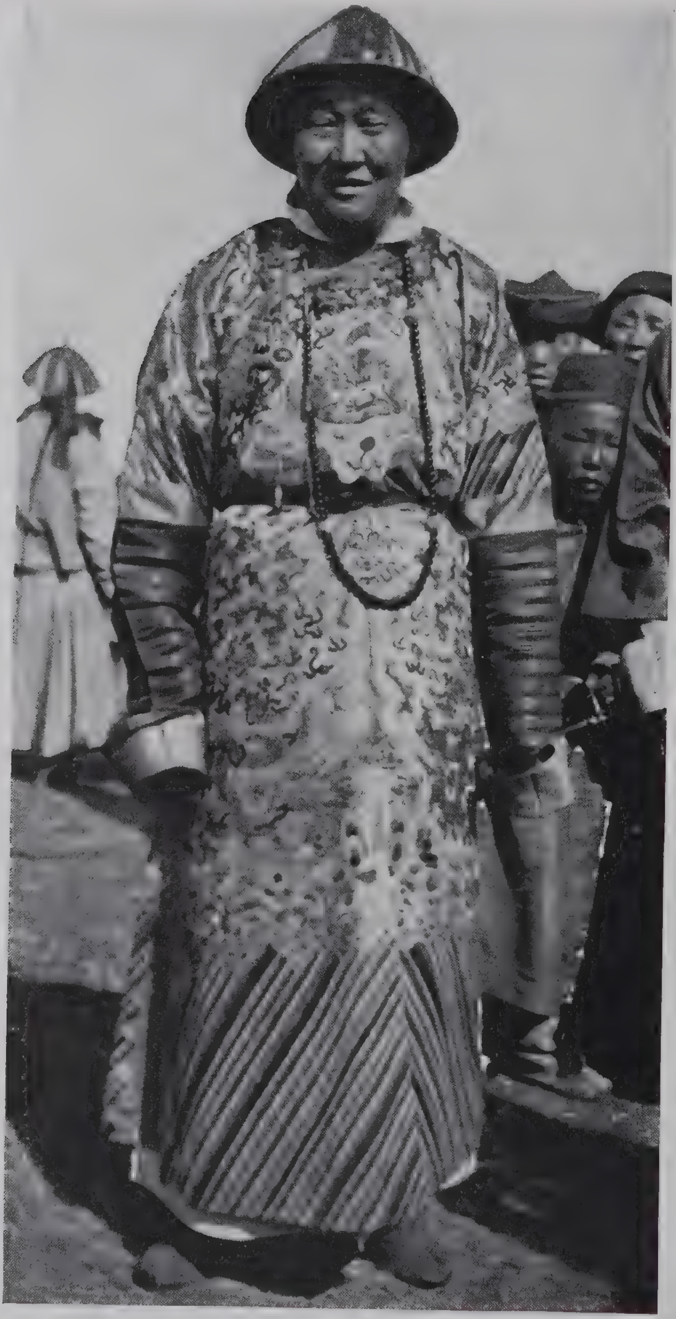
Photographs by Eugene Lee Stewart

MONGOLIAN BOYS OF THE BARGOO TRIBE

The cut and pattern of their robes about the neck are distinctive of their tribe.

SONS OF MONGOLIANS OF THE OFFICIAL CLASS

The youngster at the left is not at all frightened by the camera, but sand blew in his eye when he was trying to pose his best.



Photograph by Eugene Lee Stewart

A MONGOLIAN OF THE OFFICIAL CLASS

He is wearing a handsome brocaded yellow silk robe and an ornate necklace of wooden beads. Woven into the robe is an elaborate dragon pattern.

But the fall of the Mongols was scarcely less rapid than their rise. In China they were able to hold sway only eighty-eight years. Elsewhere their empire crumbled quickly, leaving only isolated remnants under their dominion, until today the unhappy heir of Sultan Baber sits forlorn and impotent beside the Ganges in a badly cut frock coat, with the crown of the King of Delhi on his head.

MANCHUS SUCCEEDED MONGOLS IN CHINA

When events shattered their dream of world power, the Mongols retired once more within the confines of Mongolia proper, where they have lived for centuries in peaceful isolation. The population, thinned by war to 2,600,000 souls, is spread over a vast territory embracing 1,367,000 square miles —an area more than one and a half times as great as the United States east of the Mississippi.

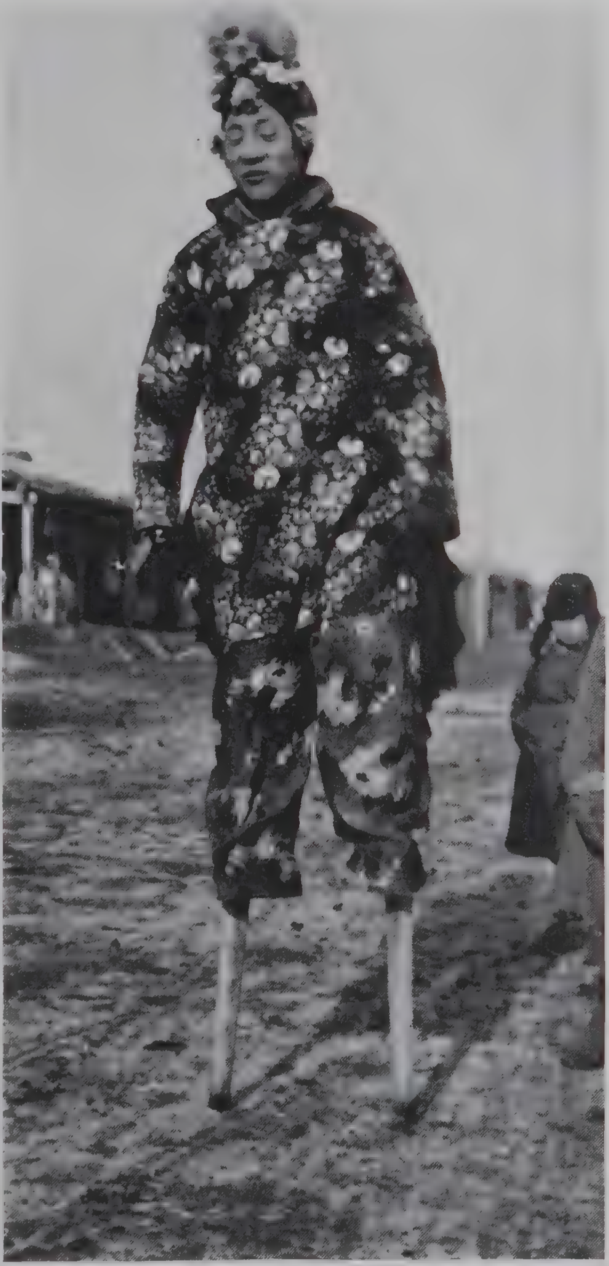
The Manchus, who took over the rule of the Mongols in China, exercised only a nominal control over them. Indeed, Manchu official feet never trod many parts of interior Mongolia, and the local Mongols were allowed practically to govern themselves, preserving their original tribal organizations, headed by native princes.

When the Manchus disappeared, the People of the Wilderness, who had never recognized any Chinese rights over them, declared their autonomy and lived contentedly under their self-appointed ruler, the "Hutukhtu," or Bogda Khan (the third Living God in the Lamaist hierarchy, whose temple palace is at Urga), until the fatal day when the Chinese Republic canceled their right of self-determination.

The stage on which this drama of Far Eastern politics took place was too remote to awaken the interest of the powers. Location, climate, and, above all, lack of communications—for Mongolia cannot yet boast a single railway, although there are plans for a line from Kalgan to Kyakhta and only recently a motor-car service has been started across the steppes to Urga (550 miles)—shut off the country from the rest of the world.

We still know little of Mongolia's resources. Gold mines certainly exist there (one of which, the "Mongolor," is beginning to be developed by American capital), as well as silver, copper, and coal mines. The rivers abound in fish, the forests in valuable timber and fur-bearing animals, while the great tablelands have farming potentialities equal to Texas and Nebraska.

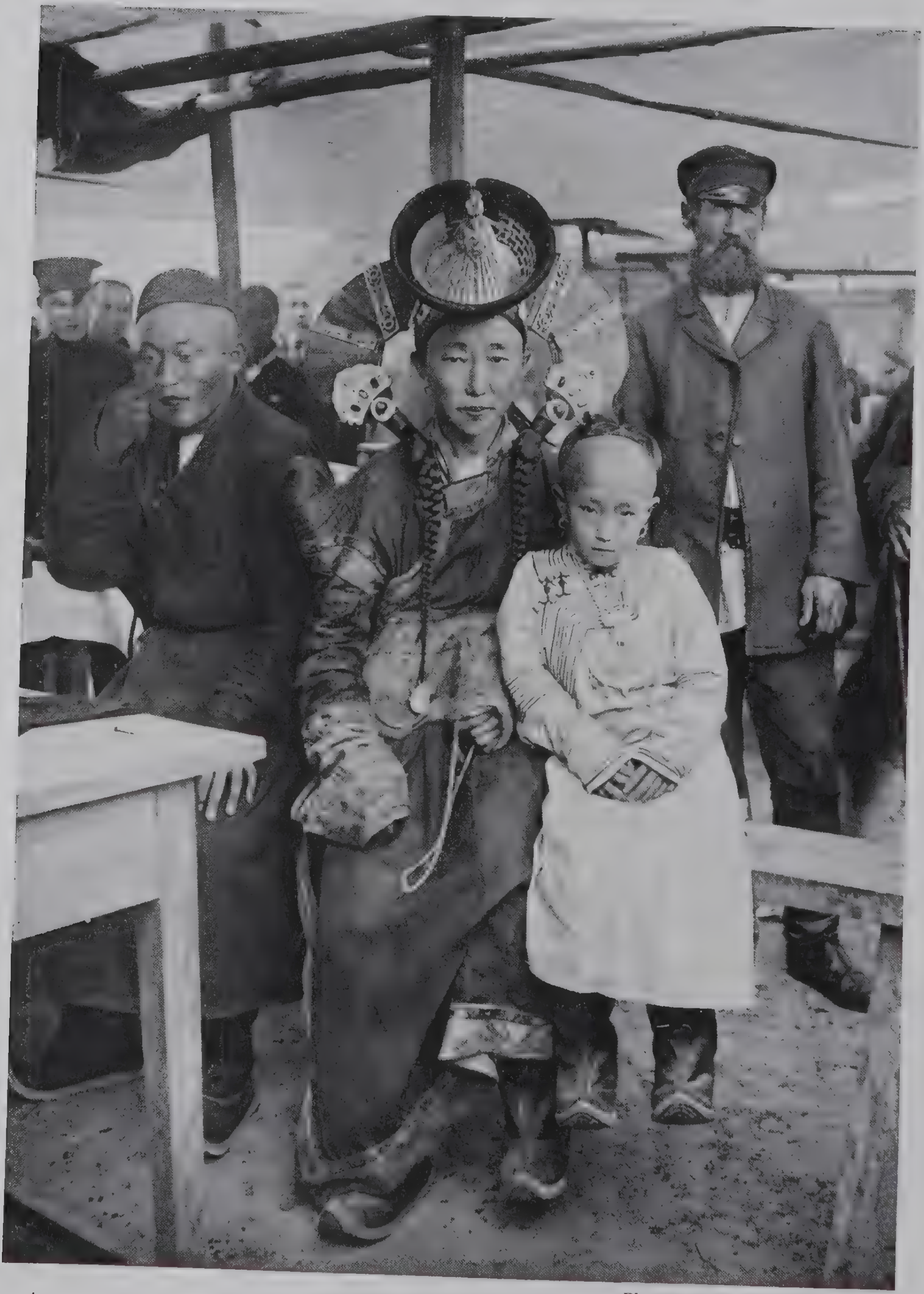
But the primitive Mongols derive little benefit from these riches. Like



Photograph by Eugene Lee Stewart

A CHINESE MAN IN FANTASTIC GARB, MOUNTED ON STILTS

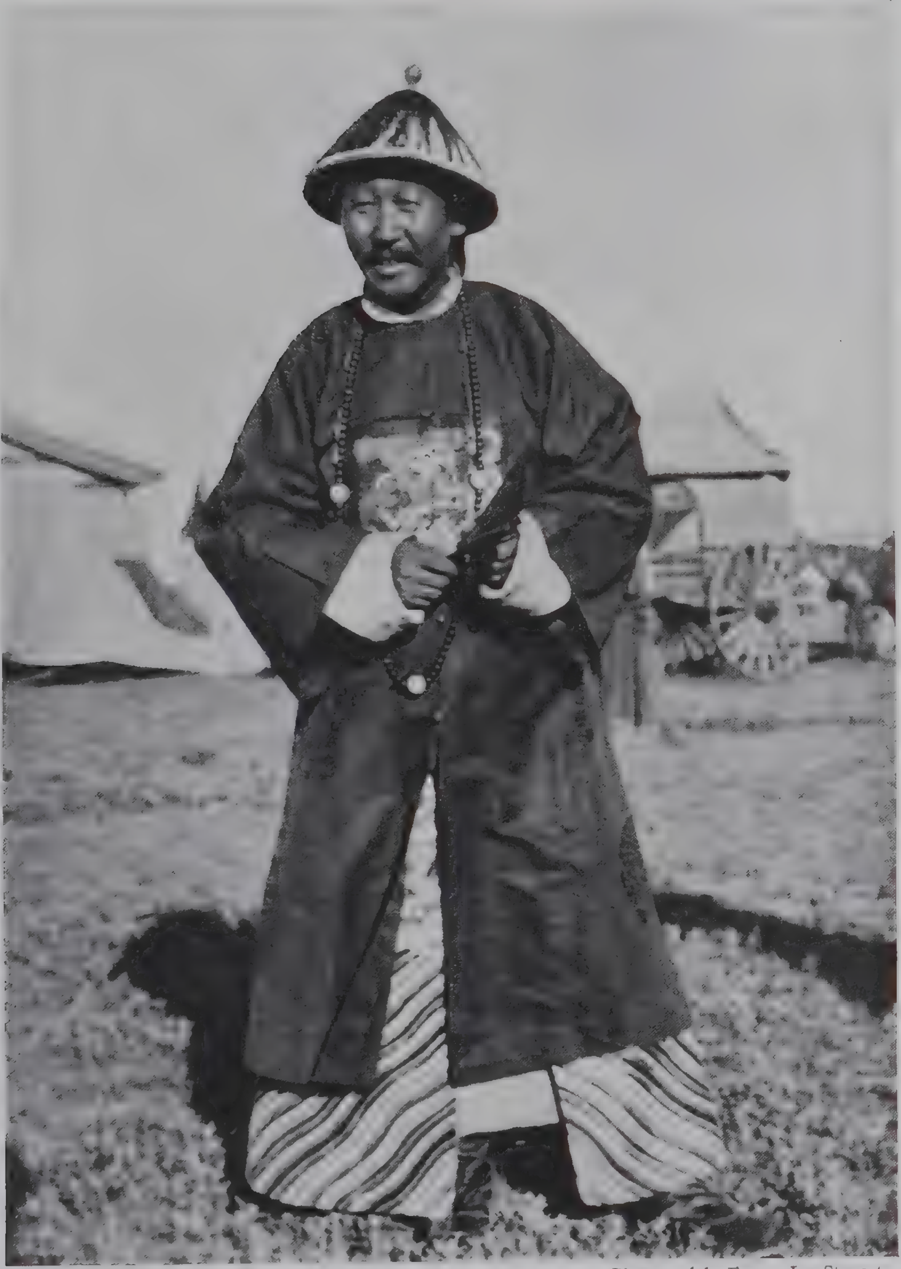
He is participating in a Chinese New Year's parade in Hailar, a town in Manchuria near the Mongolian border (see also illustration on page 520).



Photograph from Horace Brodzky

A MONGOLIAN WOMAN OF THE WEALTHIER CLASS WITH HER DAUGHTER

Note the string of beads in her hand, with which she toys; also note the talisman the girl is wearing. The mother has on her summer hat of black velvet. It is not easy to get a picture of a Mongolian child, for there is a superstition that Europeans use the eyes of children to make the lenses of their cameras.



Photograph by Eugene Lee Stewart

A CAPTAIN IN THE MONGOLIAN ARMY

He is wearing his state robes and wooden beads and is ready for attendance upon an outdoor religious ceremony. The chief difference between the garments of the men and the women is that the former gird themselves with a belt. The usual word for woman in Mongolia is "beltless."

Photograph by Eugene Lee Stewart

MONGOLIAN SCHOOLMASTERS

The man on the right is Mr. Gobel. He has had four years of college at Peking, speaks Chinese, Mongolian, and Russian fluently and quite a bit of English. He is principal of the Mongolian school at Hailar and has seventy boys learning Chinese and Mongolian and studying geography, history, reading, and writing from Chinese text-books. His assistant (at the left) studied at Tsitsihar, in Manchuria.

the lilies of the field, "they toil not, neither do they spin." They are a shining example of how men by reducing their needs reduce their anxieties.

Financial crises cannot affect them, for money as a medium of exchange is little used on the plains, where brick tea has more value than minted dollars. Municipal affairs do not concern them, for they build no cities, leading a migratory, care-free existence. They need no roads: the illimitable steppe is a natural highway where nations can pass without crowding. They require little water: in their climate men cannot wash. They want no electricity: at sundown, after a long day in the saddle, they are ready to lie down and sleep. Finally, the increasing cost of living does not trouble them, since it costs them nothing to live except the care required to guard their herds from wolves.

These herds provide them with clothing, with food, with transport, with fuel even. All over the grass-lands the flocks graze freely, watched by men unchanged since the days of the Great Genghiz.

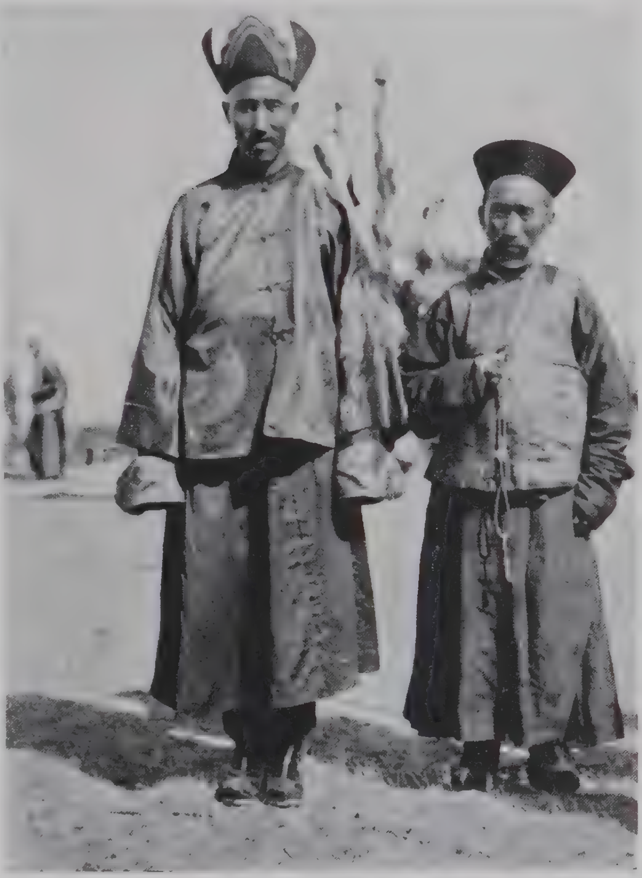
Living an easy, open life—a life of true liberty, remote from courts of justice and police—the Children of the Wilderness willingly abide by his ancient code of laws, simple, logical, humane, and admirably suited to their nomadic habits. Their lumbering ox-carts were designed in his day; their sheep and horses are the original native breeds; the ancestors of their camels carried the silken tents of the Conqueror.

"SHIPS OF THE BURNING SANDS" GAMBOL IN THE SNOW IN MONGOLIA

Mongolian camels are superb beasts, very different from the ugly, flea-bitten, one-humped Arabian variety. In all the glory of their winter coats—for, strange to say this species thrives in the cold and even delights to gambol in the snow—they are pictures of stately dignity, though in summer, when the long hair falls off in patches, they become repulsive-looking.

Winter or summer, however, these camels retain the objectionable character that Kipling has immortalized. Their breath is so poisonous that it is said no camel-driver lives long. Their kick will overturn a motor car. Their bite, followed by a twist of the lower teeth, generally induces blood-poisoning.

Particularly vicious males are marked with a piece of red cloth tied to the forelock, warning the stranger to beware. The Mongols know from experience that even a horseman is not safe from the determined onslaught of a furious camel, who can outgallop a pony and has a nasty, effective trick of throwing beast and rider and then rolling on them.



Photograph by Eugene Lee Stewart

LAMAS POSING FOR THEIR PICTURE

The tall man is a Tibetan and the smaller a Mongolian. The Tibetan Lama is arrayed in gorgeous yellow silk robes and hat and the Mongolian Lama in red silk with a jacket of yellow silk and red hat. Before posing for his picture the latter repaired to his tent and procured the handsome necklace which he is holding.

THE MONGOL HALF-SOLES HIS CAMEL

Though the largest camel will bear only a comparatively small load, lying down and squealing if an extra pound be added, he is the only freight-carrier that can cross the desert, and even he, after some days traveling in the sand, wears his feet to the quick. When this happens the Mongols throw the limping animal on his side, put his foot on a low stool, and cover the tender part with a patch of leather attached by thin thongs drawn through the adjacent callosities of the sole, much as a cobbler mends a shoe.

The camel may be useful, but the horse is much more popular among the Mongols. The native breed, indigenous to the country, is seldom over thirteen hands high and rarely beautiful. But for endurance, cleverness, and originality, the little Mongol pony has few rivals. In the depth of winter his owner neither feeds him nor provides him with shelter.

An extra growth of hair and thickness of hoof (for he is never shod) protect

Photograph by Luther Anderson

COYNESS IS NO PREROGATIVE OF OCCIDENTAL WOMANKIND

One would never suspect from her jovial demeanor and her gala costume that this Mongolian woman leads a rather lonely life in her felt-covered yurt (seen in the background) while her lord and master is tending his herds on the steppe. Her neighbors are few and far apart, and her chief opportunity for social intercourse is found during the fairs (see text, page 541).

him against the bitter cold. As for his food, this intelligent little beast learns to scrape away the snow with his forefeet and find the sparse remains of the summer grass underneath.

WILD PONIES OF MONGOLIA ARE CAUGHT WITH POLES

Though mares, easily distinguished by trailing manes and tails, are kept at home for breeding purposes, Mongol ponies are exported in great numbers to China. They roam the plains freely until wanted, and are then captured in a curious way.

Two or three Mongols start out together on fleet mounts specially trained for their work. The riders carry long birch poles, like fishing-rods, with a rope noose at one end. When the chosen animal is overtaken, the noose is slipped over its neck with a dexterous twist (see illustrations, pages 528, 529, and 530).

One man then dismounts and, squatting upon his haunches, seizes the terrified animal by the tail. Like the proverbial dog with the tin can, he starts off at a run, dragging the man behind him. The latter slides along over the grass in his soft felt boots till the beast stops exhausted. Then he is easily thrown and a saddle fixed on his back.

Again the animal struggles, squealing like a pig meanwhile, but a strong rider manages to mount him, and after a few minutes the pony is considered tamed and fit to be ridden—by Mongols, at least.

FIELD-MICE OFTEN CAUSE DOWNFALL OF EXPERT HORSEMEN

Expert horsemasters from childhood, both men and women are equally at home in the saddle. In fact, the pony is man's inseparable companion on the steppes, and the Mongol, who will never walk if he can help it, develops an unsteady, rolling gait when ill-luck forces him afoot.

The plains, stretching for miles and miles, would be ideal riding country but for one defect. Falls with fatal results are sometimes occasioned by hollow ground. Field-mice and marmots excavate galleries a few inches below the surface of the earth, and a pony passing over these must go through. Such dangerous spots are usually distinguished by a different color and appearance, but sometimes even a practiced eye may be at fault, especially in early spring, when large tracts of the plain are accidentally fired by passing caravans.

James Gilmour tells an amusing story of an accident due to a few moments' inattention—quite enough to bring down the best horse and rider.

"My guide was before me," he says in his "Travels," "and we were going at a rapid pace when all of a sudden I saw his horse with its head turned toward me, its four feet in the air and its rider undermost.

"My guide was a large man and was considerably crushed, though it is strange he was not more hurt by so bad a fall. Both his saddle girths were burst, but, true to his Mongol instinct, he held fast to the bridle. After a little while he recovered and set about repairing the damage.

"As we had no spare strings or straps with us and were far away from human habitations, I wondered how he would do this. But without hesitation he took a handful of hairs from the tail of his pony, twisted and plaited them together, and in a few minutes the straps were as strong as ever.

"Luckily for the careless Mongol horseman on a journey, who is apt to forget anything that can be left behind, the tail of his horse, which is never 'docked,' makes up for all deficiencies."

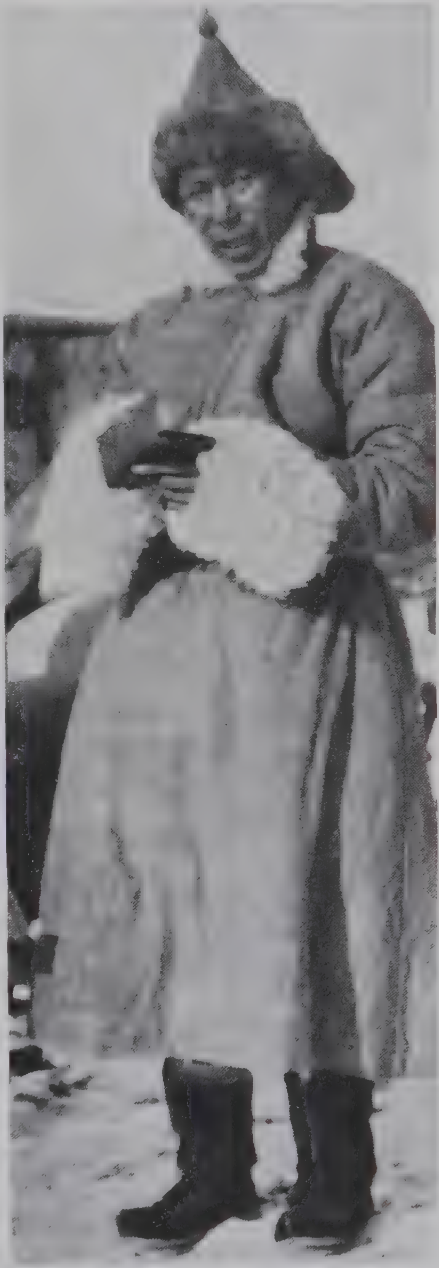
PONIES ARE GRADUALLY STARVED BEFORE A RACE

As is only natural among such confirmed horse lovers, races are a popular amusement in Mongolia. But races on the steppes are conducted quite differently from ours. Even the preliminary training of the entries seems topsy-turvy to us.

Each competing pony is tied to a rope picketed on the grass plain. This rope is shortened every day by a certain number of inches, thus reducing the circle in which the animal can graze. Yet, strange as it may seem, this method of gradual starvation—tested by centuries—appears to increase rather than diminish its endurance.

On the day of the race fetlocks are clipped and manes and tails tightly plaited with varicolored ribbons, so as to offer as little wind-resistance as possible. The jockeys are children, and it is not unusual to see lads of nine or ten start on the exhausting stampede which a Mongol race really is.

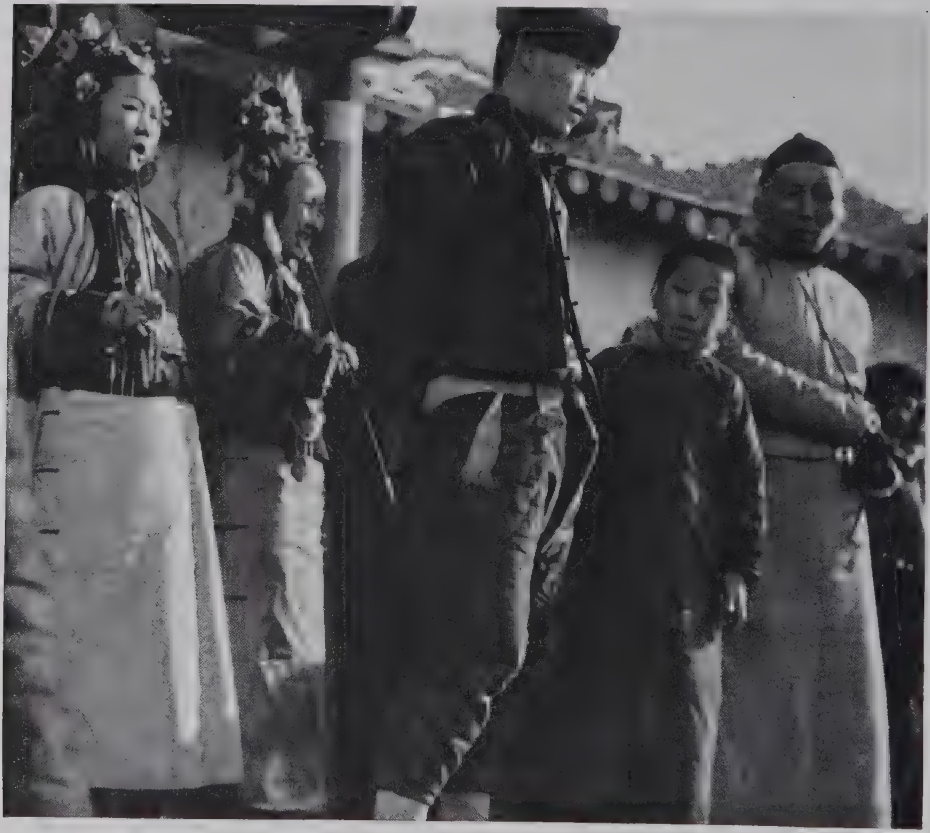
No saddles are allowed, but each rider is given a heavy whip and a handkerchief. With the latter he leans over and wipes the dust from the eyes and nostrils



Photograph by Eugene Lee Stewart

A LAMA PAYING HIS CAB FARE IN A MONGOLIAN BORDER TOWN

His name is Yoongadoong. He belongs to the Hkalka tribe, and is attired in new flaming red robes, cap, and black boots trimmed in green.



Photograph by Eugene Lee Stewart

MONGOLIAN WOMEN OF HAILAR IN HOLIDAY ATTIRE WATCHING A CHINESE NEW YEAR PARADE

In the right foreground are a Chinese man, a Chinese girl, and a Mongolian man.

of his mount, as otherwise the dust of the steppe might injure wind or eyesight.

RACING PONIES LEAN ON EACH OTHER FOR SUPPORT

The straight course is so long that often there is a good deal of difference in time between the arrival of the ponies.

Enthusiastic owners or spectators, including bishops and archbishops of the Lamaist faith (for the church does not frown on racing on the plains), gallop out to meet the contestants and assist in whipping them in. But sometimes two favorites arrive at the finish literally leaning against each other shoulder to shoulder. Thus they support each other on the run, though both are so exhausted that if they were suddenly separated they would drop in their tracks.

Wonderful tales are told of the distances covered by famous Mongol racers at a stretch. Fifty, even a hundred, miles at full gallop are claimed. This is doubtless exaggeration, but fifteen- and twenty-mile races at great speed are well authenticated.

After the "meeting," the crowd usually adjourns to some neighboring monastery, where a festival in honor of the day is held.

A RELIGION OF TERROR

In Mongolia monasteries are the great centers of amusement, interest, culture, and—wickedness (see illustration, page

Photograph from Horace Brodzky

A MONGOLIAN SOLDIER SMOKING HIS PIPE

The Mongolian never drinks water or anything cold. He uses brick tea, made of tea dust from Chinese factories. A "brick" is as hard as granite. When a Mongolian wants a drink, he wraps the brick in an old cloth and places it in hot cow dung until it gets soft enough to enable him to break off a piece. This piece he grinds in a mortar and boils up in a horrible mess with milk or lumps of fat. He uses salt instead of sugar in his tea. He has a method of boiling his milk that makes it look like custard.

544). The priests exercise complete sway over the people by their unlovely religion of terror, the Tibetan form of one of the later sects of Buddhism known as the Tantric—a revival of the morbid Indian cult of Siva.

This repulsive creed, with its hideous demonology, is so well suited, however, to a land where cruel and tremendous atmospheric phenomena make man appear a helpless atom struggling against the mighty natural forces of existence, that it prospers.

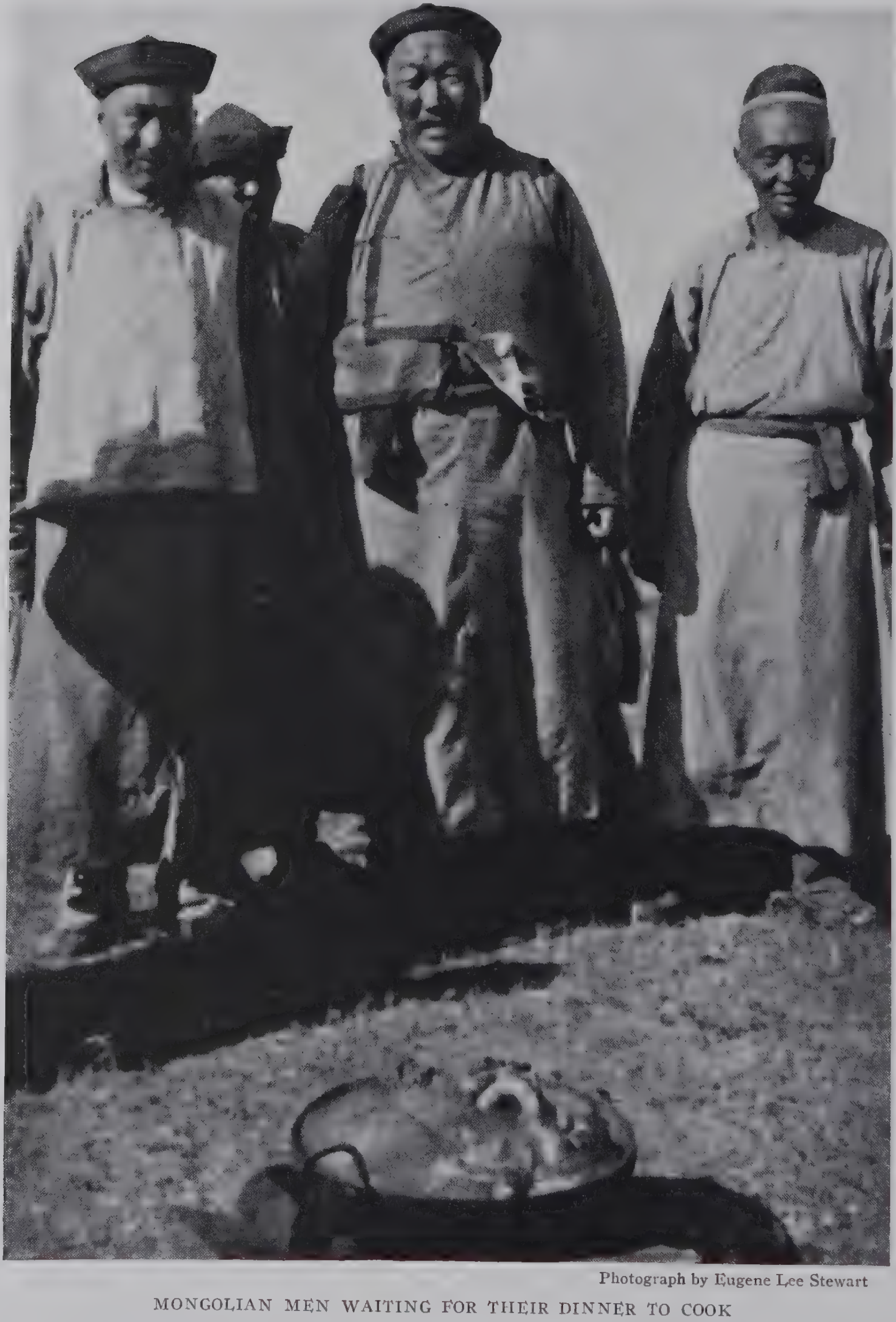
Like frightened children, the People of the Wilderness desire to see their terrors embodied in idols which may be placated, and the cunning monks are quick to take advantage of their fears. Thus monasteries arise and grow rich.

These establishments are the finest buildings in Mongolia. Resplendent from afar in colors and gold, their lofty square buildings, often standing on some rise of ground, lose their effect somewhat on closer view, owing to the dirt in which these communities of monks are content to live.

"THE ABODES OF THE LIVING BUDDHAS"

The most famous and best kept monasteries are the abodes of the Living Buddhas. The current belief is that these men are gods incarnate, and when they die, or, as the Mongols put it, "change the vehicle," are reborn into this world with the power to remember their former existence and prove their identity by using phrases characteristic of the last Buddha, selecting things that belonged to him from among many which were not his, etc.

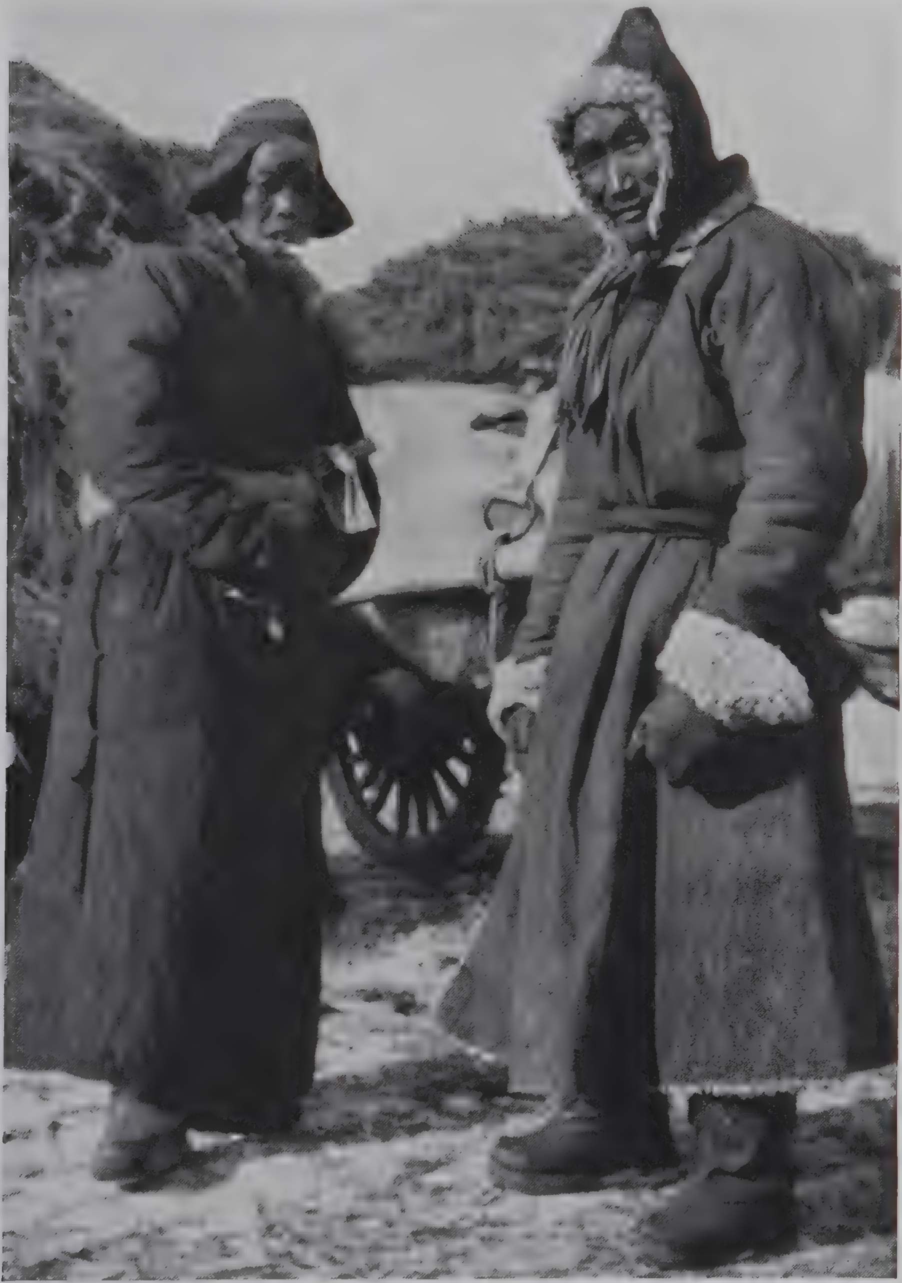
Great parade is made of the testing of a new candidate. Of course, the chief Lamas arrange everything and coach "the



Photograph by Eugene Lee Stewart

MONGOLIAN MEN WAITING FOR THEIR DINNER TO COOK

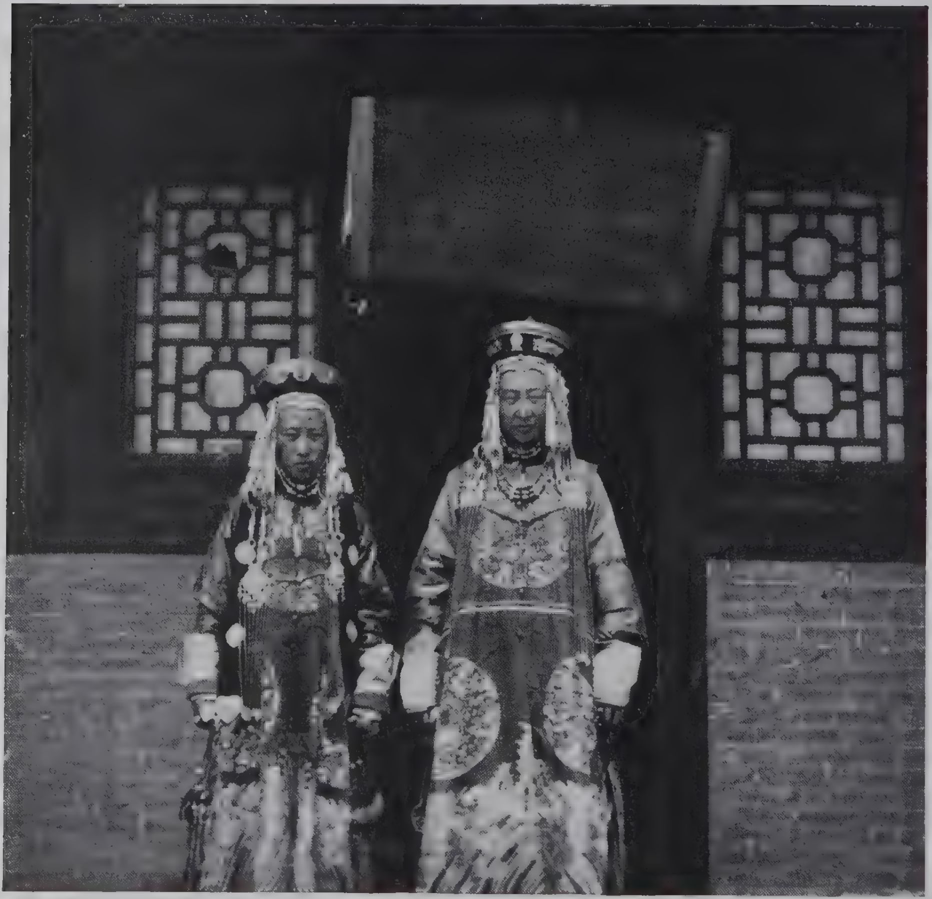
The average evening meal of the Mongolian "tenthold" consists of mutton boiled with a kind of millet. When done, the morsels are fished out of the pot with fire-tongs and served in a rude basin or on a board (see also illustration, page 501).



Photograph by Eugene Lee Stewart

A MONGOLIAN OF THE BURIAT TRIBE (AT THE RIGHT) BARGAINING WITH A CHINESE

The men of the Buriat tribe usually shave their heads and wear a pigtail. In summer they wear silk and cotton gowns; in winter, sheepskins and furs (see also illustrations on page 494).



Photograph by Adam Warwick

MONGOLIAN WOMEN IN GALA ATTIRE

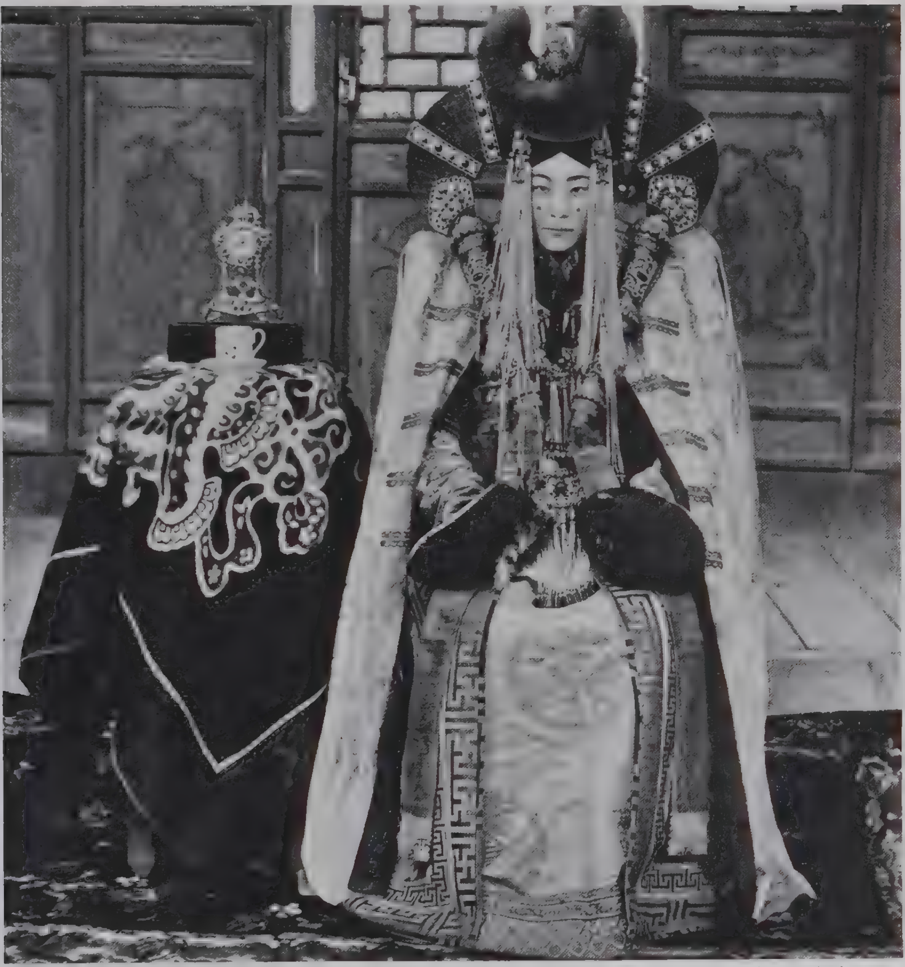
On ordinary occasions the chief article of apparel for both men and women is a wide, roomy coat of plain material, but on holidays the women wear elaborately embroidered gowns. Note the headgear with curtains of red coral, turquoise, and pearl.

successor," but the common people, perhaps even the majority of the monks, believe the hoax most implicitly.

The crowd that makes its way to the monastery after the races gives abundant proof of the part religion plays in Mongol every-day life. Many a man will be saying his prayers or counting his beads as he rides along. Follow him to the temple itself and you will find him, as soon as he dismounts, joining a company with dust-marked foreheads to make the rounds of the sacred places, visiting at every shrine, bowing before every idol, prostrating himself on sloping wooden platforms.

Fanatical devotees may be met performing the "falling worship"—that is to say, throwing themselves flat on their faces and marking the place of their next prostration by their foreheads—a very exhausting form of piety, which soon wears out hands and clothes unless (as generally happens) wooden sandals are fitted to the hands and sheepskin pads to the knees.

Even little children may be seen turning prayer-wheels filled with written prayers, the idea being that any devout believer who turns the wheel acquires as much merit by so doing as if he had repeated all the prayers thus set in motion.



Photograph from Luther Anderson

A MONGOLIAN LADY SITS FOR HER PORTRAIT BEFORE A CHINESE PHOTOGRAPHER

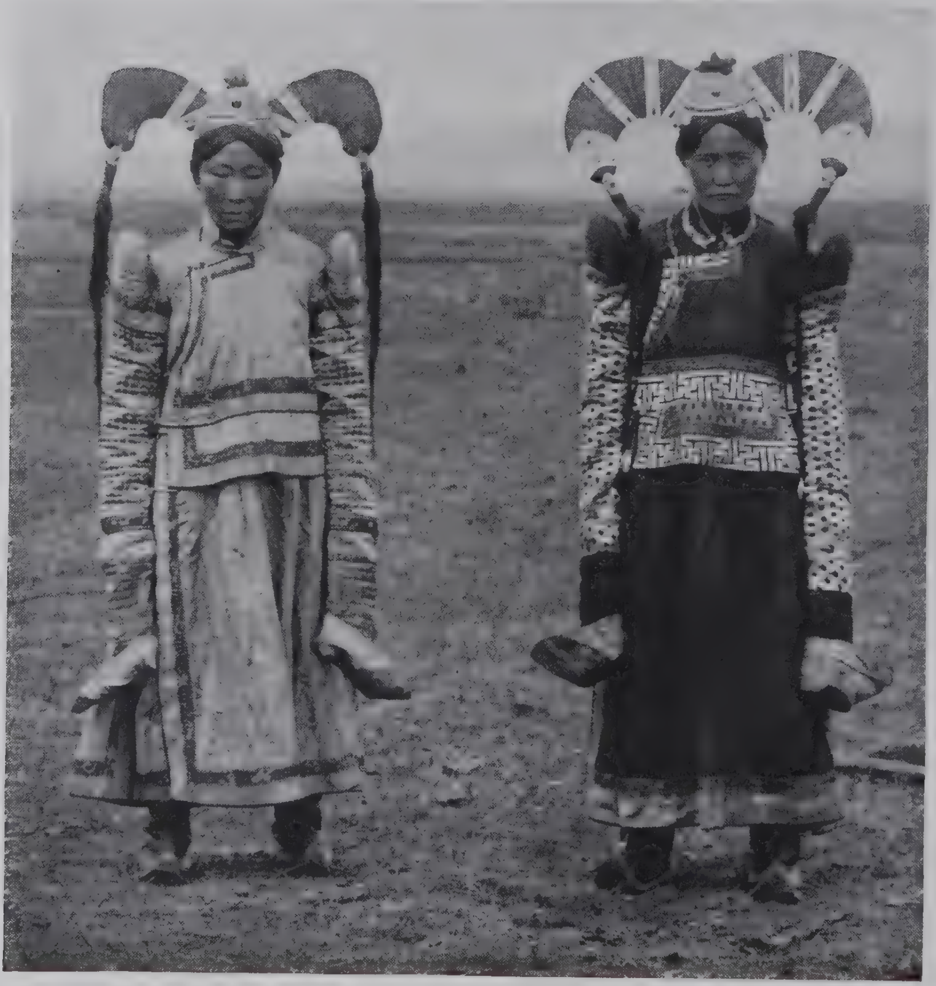
Note the primness of the pose, the beauty spot on each cheek, and the cup-and-saucer and clock decorations at the lady's right.

One of the greatest festivals of the Lama church is the Devil Dance, which takes place each spring and represents the chasing out of the Spirit of Evil. The dance is simply a series of posturings of men and boys in rich costumes and fearsome animal masks accompanied by an impressive chant.

But a far more interesting survival of the primitive nature cult is known as the Midsummer Festival. It attracts crowds of pilgrims. Caravans begin to arrive many days in advance, when the surroundings of the temple present a busy scene of activity, with Chinese traders crying their wares and itinerant restaurants preparing food.

The richer and more prosperous visitors arrive in camel-carts, with an impressive train of outriders, and camp in their own tents. Some families come in bullock-wagons, which, with a few mats fixed over them, make admirable shelters for their stay.

But by far the greatest number appear on horseback, solitary or in companies,



Photograph from Horace Brodzky

TWO MONGOLIAN BEAUTIES, THE WIVES OF WELL-TO-DO CATTLEMEN

They wear their wealth upon their hair, including a profusion of silver ornaments.

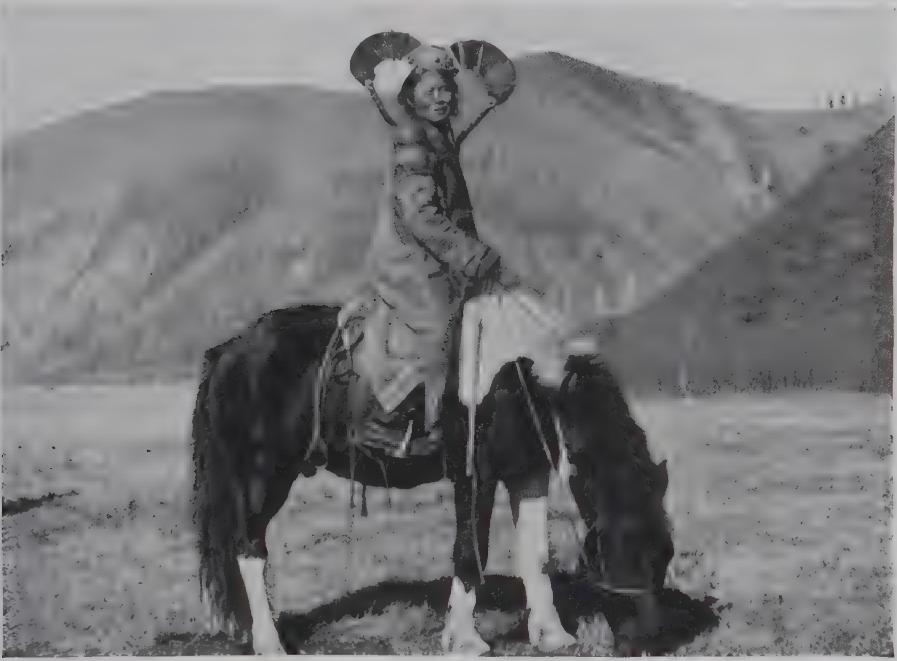
men and women, respectable characters and notorious thieves, Lamas and laymen, dressed—some well, some poorly, but nearly all gaudily—in yellow, blue, red, white, or green.

On the day of the ceremony the monastery is astir before dawn. The monks of various grades assemble soon after cockcrow, gorgeous in purple hieratic gowns, red waistcoats, scarlet or golden togas.

The Living Buddha appears in his fringed orange felt helmet, the abbots in their fat lacquer hats, the lesser Lamas in silk or gold brocade skull caps, the lay officials in the old Manchu hats topped with colored buttons to denote their rank.

The whole company rides out of the monastery gate on ponies well groomed for the occasion and crosses the steppe to the obo, or sacred mount.

Such elevations, crowned by piles of stones with a flagstaff and fluttering prayer banners in the center, are landmarks all over Mongolia (see illustration, page 543). They represent the ancient totems to the nature spirits which have been adopted by Lamaism from the "Black Faith" (Shamanism) and dedi-



Photograph by Adam Warwick

A MONGOLIAN PEASANT WOMAN RETURNING FROM A MIDSUMMER FESTIVAL

Note the typical Mongolian coiffure. The precise nature and shape varies according to the tribe.

cated to some saint of its own creed. Every Mongol stops to worship at them, leaving some kind of an ex-voto to attest his piety—a bit of rag or fur from his clothing or a handful of hairs from his horse's mane or his own head.

Having ascended the hill, the priests gather round the stone cairn, which has been previously decorated with leaves and branches. A tent is set up near by for the Living Buddha, the high Lamas, and the civil officials. Lesser dignitaries squat upon the ground in a circle.

Then the weird service begins, accompanied by all the strange paraphernalia of the Lama cult—huge bronze trumpets six feet long, flutes made from sea shells, and libation cups from human skulls.

A FEAST OF COLOR IN A RADIANT LANDSCAPE

The ceremony must be completed by sunrise, when the participants return to the monastery for the popular festival, some riding rapidly, some riding cautiously, but all converging on one center, and many of them ending up with a furious gallop to show their fine ponies at their best.

The crowd is a feast of color in a radiant landscape. The background of distant blue hills merges into a translucent blue sky, where an eagle, sharply silhouetted in the clear air, circles above. Holy cranes watch solemnly beside the waters of a distant salt lake that reflects the azure of the heavens. Queer long-tailed mice prowl about. A spotted deer, whom it is a sacrilege to kill, stands fearlessly—an orange speck—beside the temple, and a herd of fleet "tserengs," or steppe antelope, knowing the hunter is less considerate of them, bounds away toward the horizon.

By this time a group of white tents has been erected in the meadow for the feast. The largest serves as a reception hall. Inside a big transversal bench has been prepared for the guests of honor, whose places are marked by double cushions covered with priceless old silk carpets

Photograph by Adam Warwick

A PAIR OF MONGOLIAN HORSE-CATCHERS

The riders carry long birch poles, like fishing-rods. Mongol ponies are exported in great numbers to China. The mares, which are easily distinguished by their flowing tails, are kept at home for breeding purposes.

Photograph by Luther Anderson

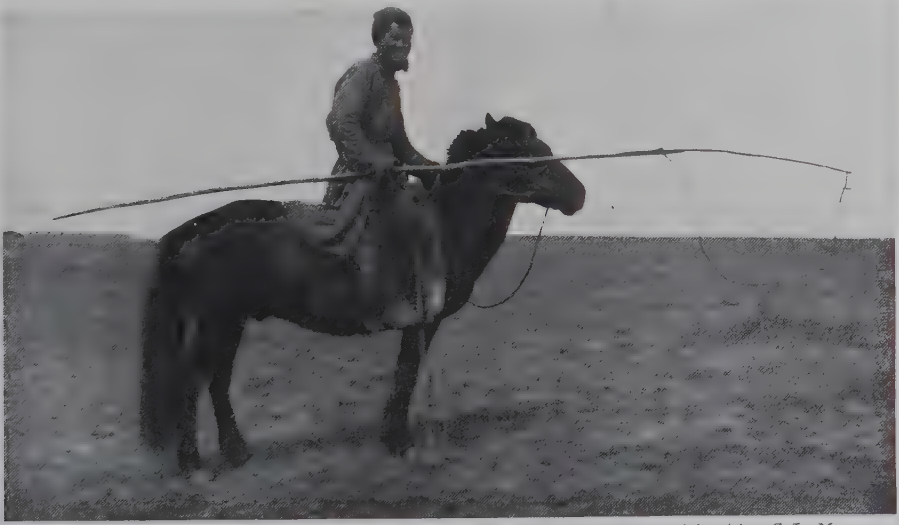
A MONGOL COWBOY

Expert horsemasters from childhood, both men and women are equally at home in the saddle. In fact, the Mongol so seldom walks that he develops an unsteady, rolling gait when ill luck forces him afoot.

Photograph by Adam Warwick

TAMING AN UNBROKEN PONY

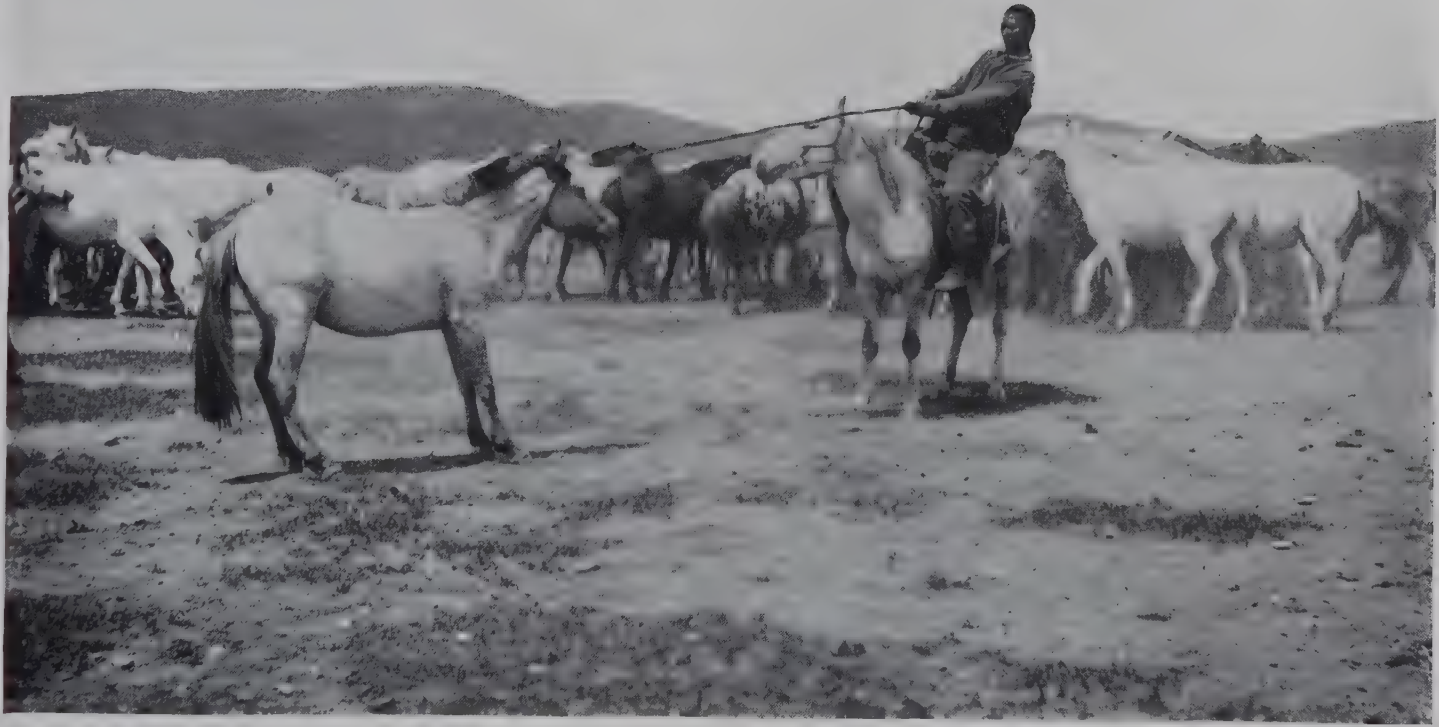
The man on the ground will, in a moment, seize the pony by the tail. The animal will start off at a run, dragging his captor behind him. The tamer slides over the grass in his soft felt boots until the pony is exhausted (see text, page 518).



Photograph by Ethan C. Le Munyon

A MONGOLIAN HORSEMAN

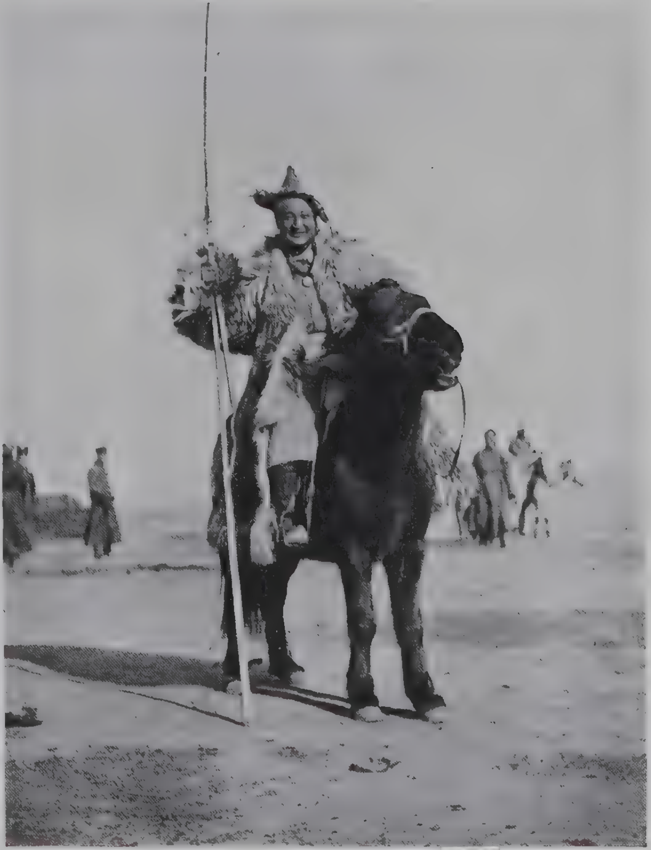
The pole with the slip-noose is used in place of the lariat and is almost as effective, as the rider will ride into a herd and "cut out" the horse he wants, drop the noose over his head, and soon subdue him.



Photograph by Adam Warwick

LASSOING A MONGOL PONY

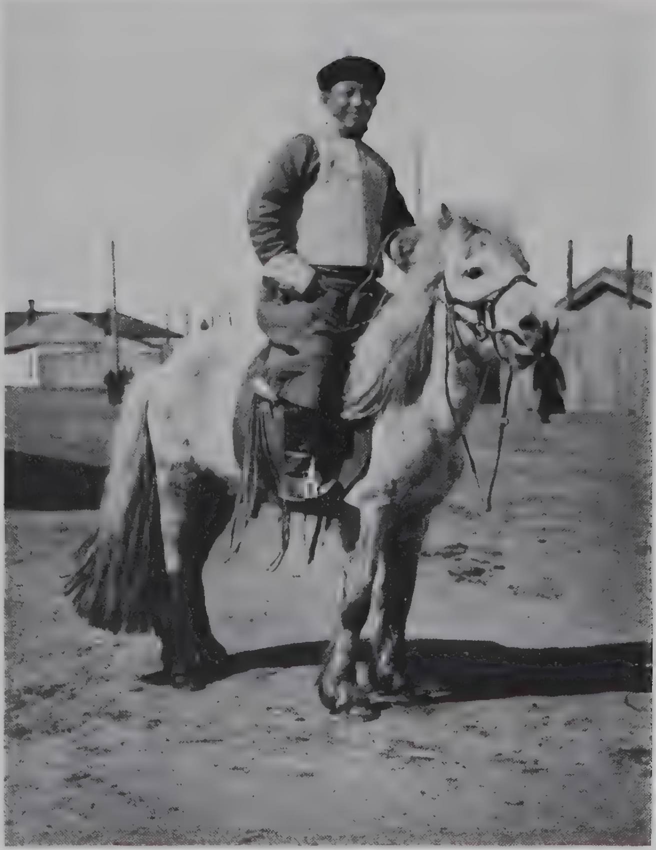
The native breed of horse is seldom more than thirteen hands high, but for endurance and cleverness it has few rivals. It is never a source of care to its owner, who provides neither food nor shelter. A long coat of hair in winter suffices for the latter, and when the snow covers the pasture land the little beast paws its way to the sparse remains of summer grass underneath.



Photograph by Luther Anderson

A HARDY, SELF-RELIANT, HOSPITABLE MONGOL OF THE STEPPES

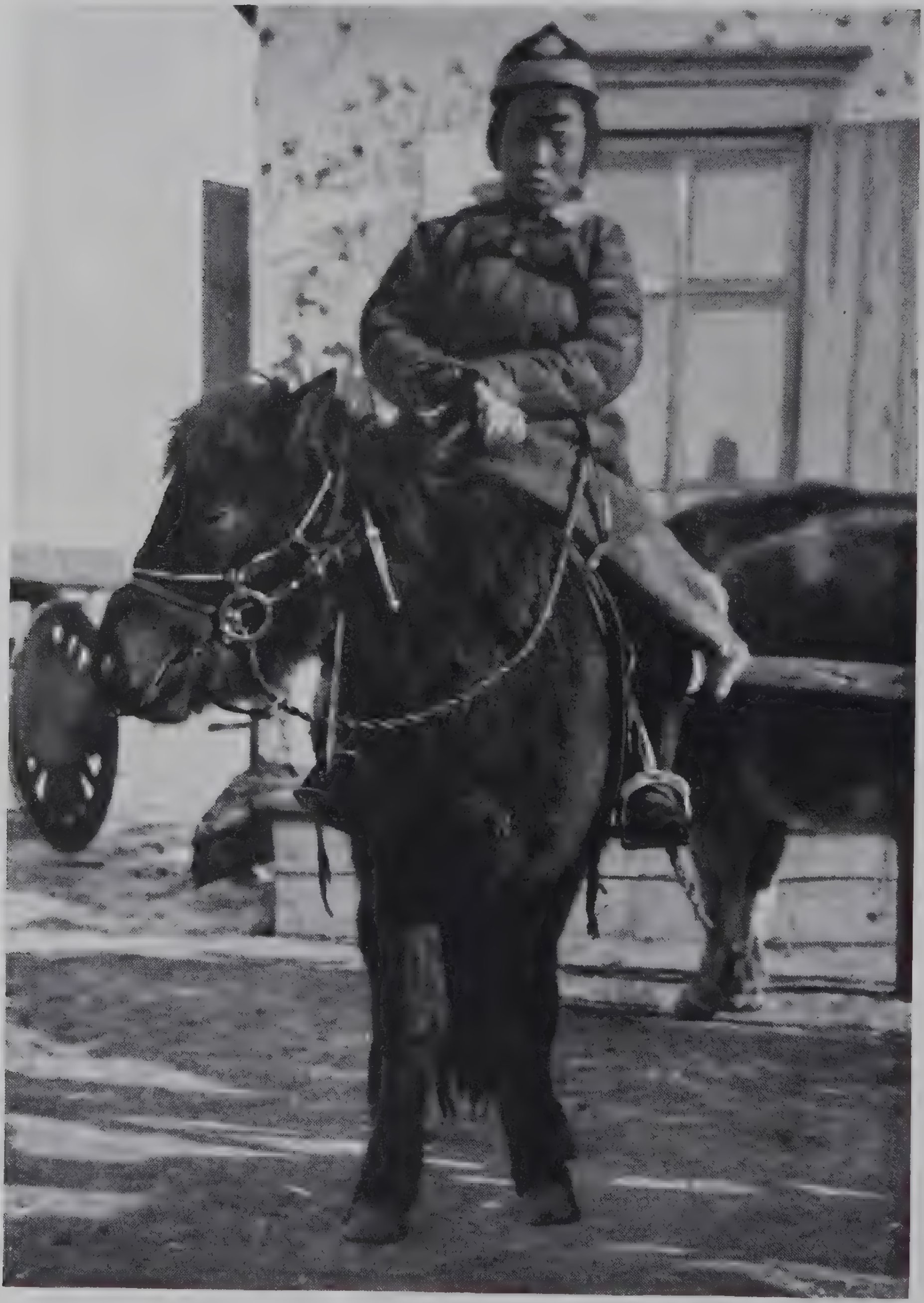
He cares not for wealth or power. His flocks and herds provide him a livelihood, and his temporary abiding place (usually for ten days at a time) is wherever he chooses to pitch his tent.



Photograph by Eugene Lee Stewart

A MONGOLIAN LAMA POSING FOR HIS PICTURE

The Lamas, and in fact nearly all Mongolian men, are glad to have their pictures taken, but it is a decidedly different story attempting to obtain photographs of the women.



Photograph by Eugene Lee Stewart

THE SON OF A HIGH MONGOLIAN OFFICIAL, WEARING HEAVILY PADDED WINTER CLOTHING

The Mongolians might be said to be born on horseback. Women ride as well as men. In the races, the children jockeys ride without saddles, but carry handkerchiefs to wipe the dust from their ponies' eyes and nostrils.

Photograph by Eugene Lee Stewart

A MONGOLIAN OF THE OFFICIAL CLASS AND HIS NEPHEW, MOUNTED ON A MONGOLIAN PONY

from the treasury of the monastery. Two choirs of singers in bright robes kneel on either side of the broad entrance and chant a welcome.

Soon the feast begins. A cup made of the precious "zabia" wood, which will make water boil and has the power to detect poison, is placed before each distinguished visitor, with smaller cups for the "airak" and "koumiss"—liquors made from fermented milk.

The principal meat dish is mutton. Sheep are served whole on large platters, the four legs arranged around the rump, the skull on top.

As a kneeling attendant passes each dish to a guest, the Lama host makes a cross on the skull, which is then taken away. A second serving Lama, acting as butler for the occasion, then cuts up the meat. The rumps and tails are given to those whom the monks especially delight to honor.

This curious custom originates from the fact that, a sheep having but one tail, the presentation of this delicacy to a person necessitates the slaying of a sheep especially for him, and it must also be a good one, for none but a fat sheep has a tail fit to be seen.

"TABLE MANNERS" IN MONGOLIA

To the foreigner a Mongol feast is a doubtful pleasure. He dislikes the idea that the unfortunate sheep have been slaughtered in the barbarous native way (said to preserve the flavor), by ripping open their bellies, after which operation the butcher puts his hand into the viscera and snaps the aorta. It is difficult also

A MONGOLIAN CAMEL-DRIVER AND HIS CHARGE

It is a tradition among the People of the Wilderness that the breath of the camel is so poisonous as to shorten the life of the driver.

Photographs by Eugene Lee Stewart

MONGOLIAN CAMELS FORAGING THROUGH THE SNOW AND OFF THE TOPS OF TREES

It will be noted that the Mongolian species is the Bactrian, with two humps, whereas the dromedary, or one-hump animal, is found in Arabia.

Photograph by Luther Anderson

A MONGOL OX CART

This is the same type of cart which was used by Genghiz Khan to transport his army supplies seven centuries ago.

Photograph by Eugene Lee Stewart

A CARAVAN STARTING FROM HAILAR TO URGA

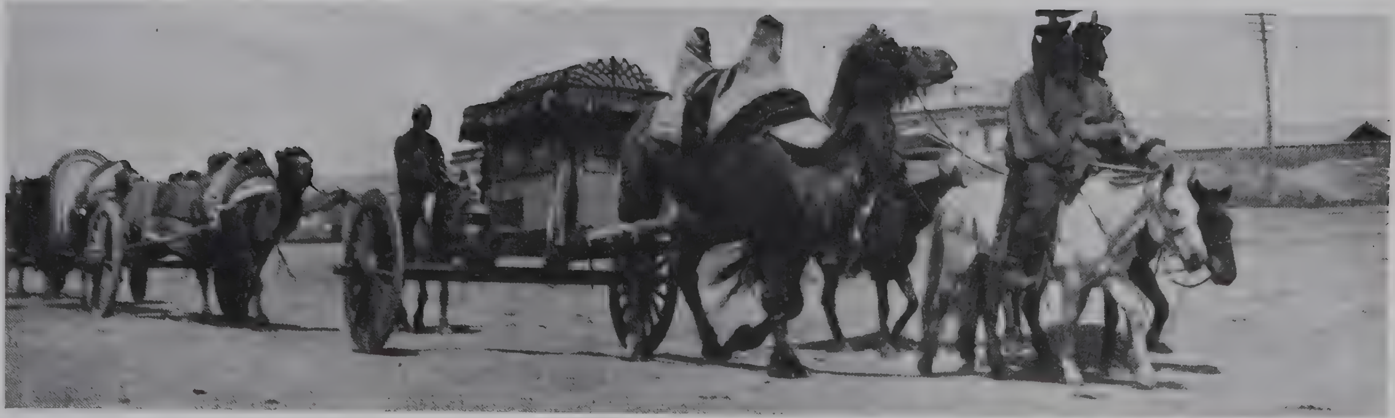
These caravans number from ten to fifty camels. They carry blankets, clothing, tobacco, and other commodities to the native population of Urga and usually return empty.

THE FOREST ZONE OF OUTER MONGOLIA

Photographs by Douglas Carruthers

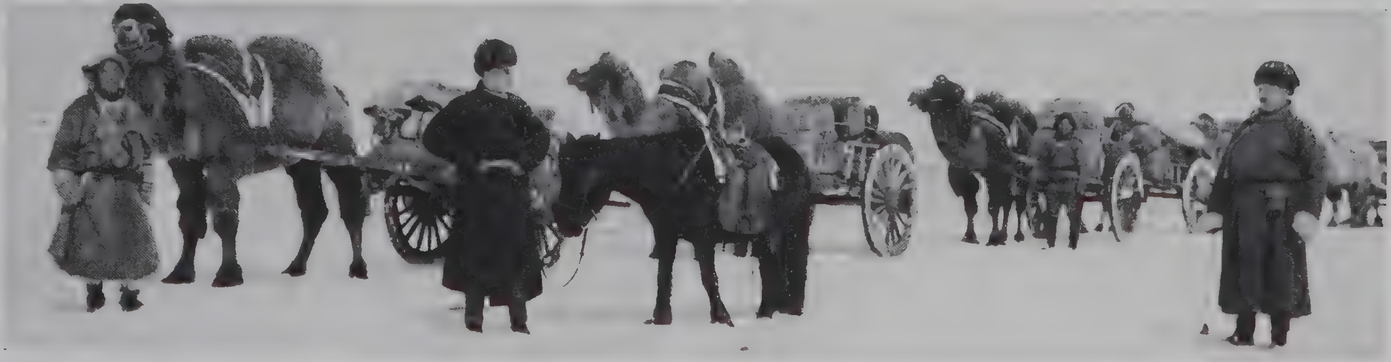
JOURNEYING TOWARD MONGOLIA'S PASTURE LANDS

The most fertile portion of Mongolia lies to the north of the Gobi Desert, along the Siberian frontier.



Photograph by Adam Warwick

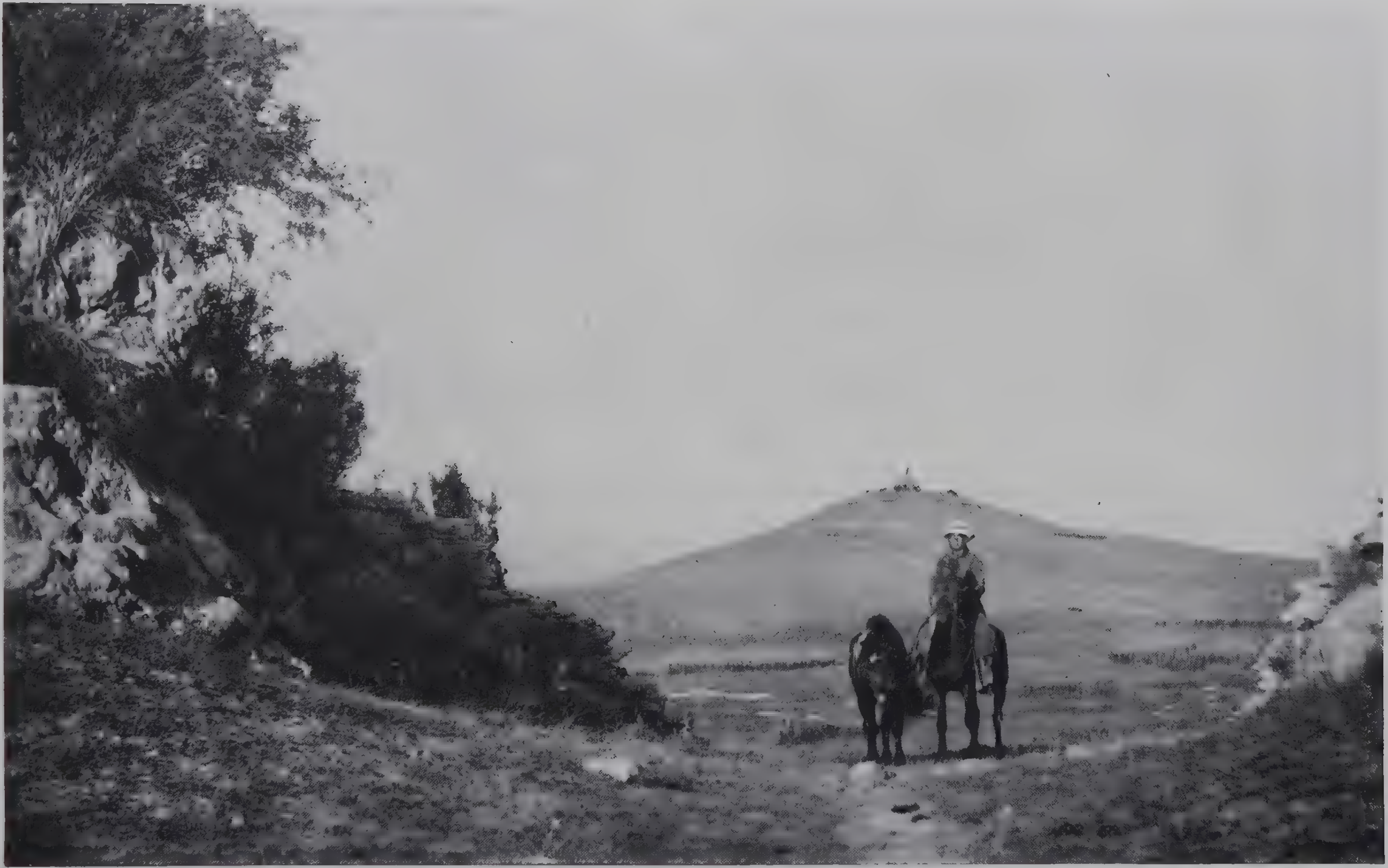
WEALTHY MONGOLIANS TRAVEL TO THE FAIRS IN CAMEL-CARTS WITH AN IMPRESSIVE TRAIN OF OUTRIDERS (SEE TEXT, PAGE 525)



Photograph by Eugene Lee Stewart

RUSSIANS SUPERVISING THE DEPARTURE OF A CARAVAN FROM HAILAR TO URGA

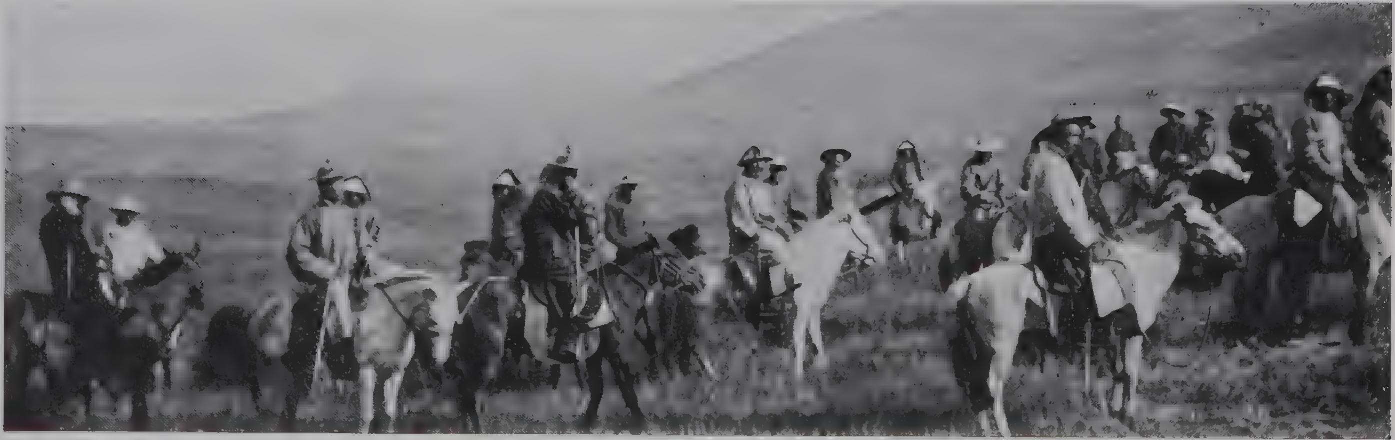
The two men with the fur caps are the owners of the caravan. As soon as it is under way, they will return to their homes in town, and at the end of a week or ten days will mount their ponies and overtake the caravan, in order to be present when it arrives at the Mongolian capital.



Photograph by Adam Warwick

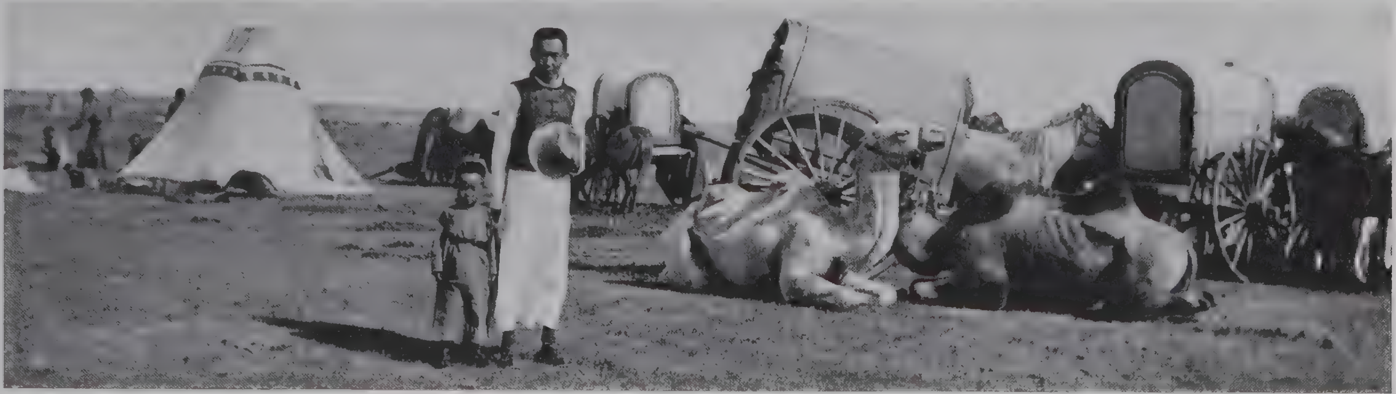
A MONGOLIAN OBO ON THE DISTANT HORIZON

These elevations are landmarks in all parts of Mongolia. They represent the ancient totems to the nature spirits (see also illustrations on pages 542 and 543).



Photograph by Adam Warwick

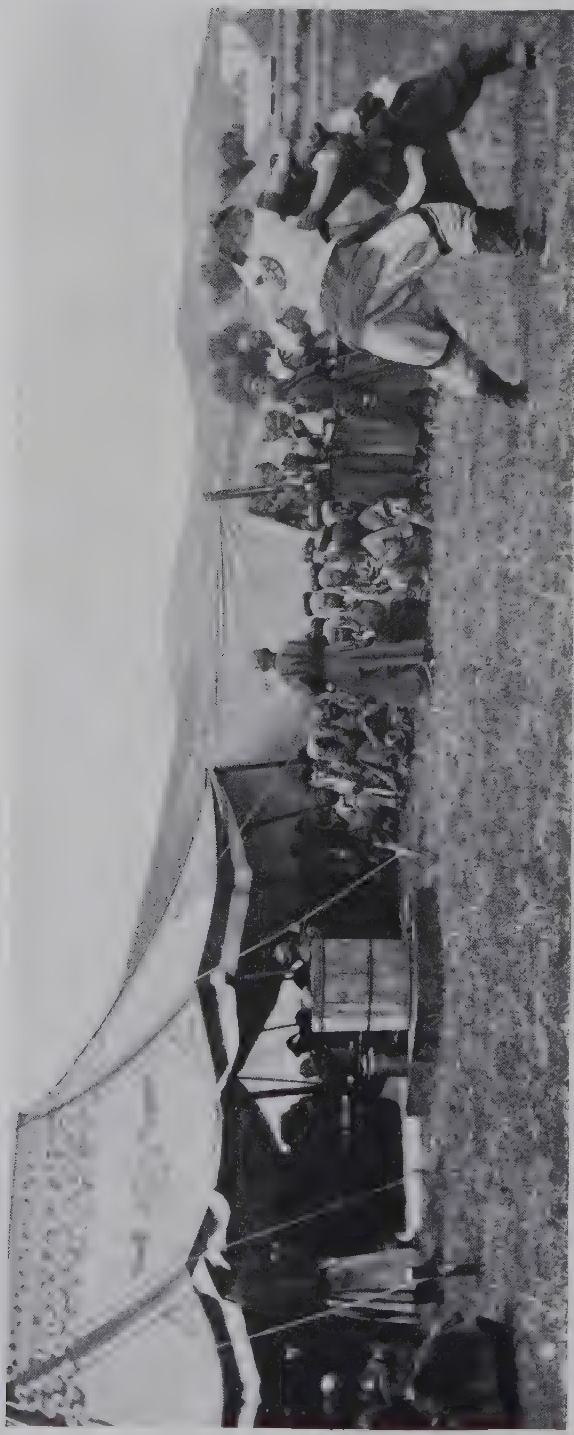
A COMPANY OF MONGOLIANS STARTING ACROSS THE STEPPE TO THE OBO, OR SACRED MOUNT (SEE TEXT, PAGE 526)



Photograph by Eugene Lee Stewart

A MONGOLIAN LAMA CAMP

The priests are conducting religious services near by and will remain camped here for several days. A Mongolian school teacher and his nephew are seen in the foreground. The camels have been recently clipped.



Photograph by Adam Warwick

A WRESTLING BOUT AT A MONGOL FESTIVAL

At the conclusion of the match, which consists of three rounds, the winner will approach the grandstand tent in kangaroo-like leaps, as etiquette requires. He will kneel before the Lama, who will bestow upon him a robe of silk, an embossed silver cup, or an honorary scarf.

to eat comfortably, having to attack, with only the assistance of a knife, a great expanse of fat mutton spread on a brass dish nearly two feet in diameter.

Practice, however, makes Mongols expert, and in an incredibly short time each native has gobbled his share, seizing the piece of meat in his left hand and cutting it off close to his lips, while the knife flashes past so close to his face that, but for his short nose, accidents would certainly happen.

After all have gorged themselves and grown cheery with copious drafts of airak, hosts and guests mingle with the crowd in the meadow for the "fun of the fair." Many gather round a story-teller, who recites a legend drawn from the rich Mongolian folklore, some historical incident connected with the Great Khan or some quaint fairy tale inspired by the mystery of the steppes.

A MONGOLIAN WRESTLING BOUT

The majority hasten to see the wrestlers (see illustration on this page). Dressed in a costume with stiff vest and short skirt, not unlike the garb of a Roman soldier, two champions face each other in the center of an open space. One is obviously a horseman, to judge by his

Photograph by Eugene Lee Stewart

MONGOLIANS BRINGING SIBERIAN SHEEP TO MARKET

The "shepherd's crook" is the familiar long pole with a noose at the end (see also illustrations on pages 528 and 529).

bowed legs. His length of arm and breadth of chest show him to be a redoubtable opponent. The adversary is a gigantic Lama belonging to the "tsang" (community of the Living Buddha) of the neighborhood. Three rounds constitute the match, and according to the rules neither wrestler may grip the other, but each must try to throw his opponent by laying hold of his belt.

The first bout is adjudged to the Lama amid great enthusiasm; the second goes to the horseman, and the third, which the crowd watches in a fever of excitement, is also won by him after a hard struggle.

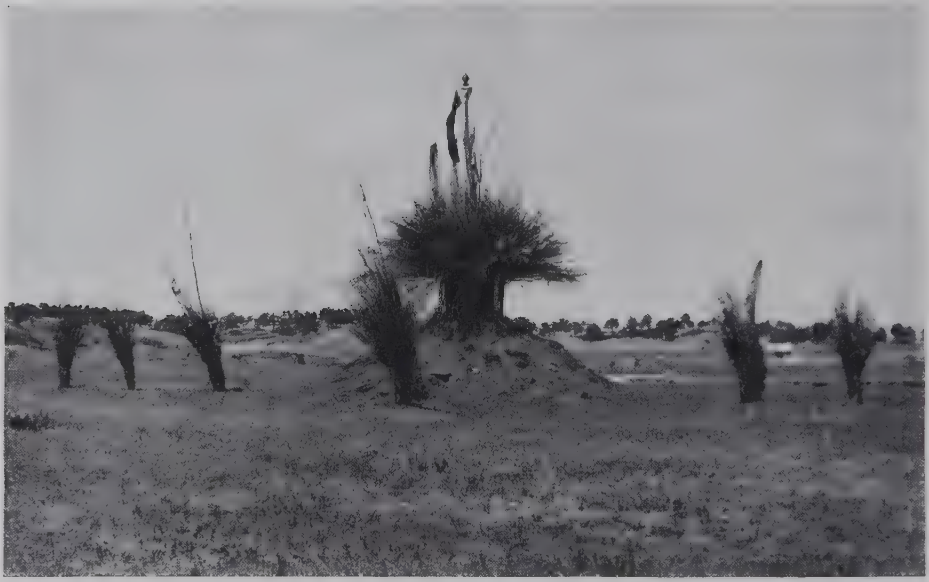
Then the proud champion, much cheered, rises to his full height, expands his mighty chest, and approaches the entrance to the grand-stand tent in big jumps, as etiquette requires. Here he kneels before the Lama, who distributes the prizes, and receives a reward—a roll of silk, an embossed silver cup, a "Khadak," or honorary scarf, or a few bricks of tea, which he raises above his head in token of thanks. After that he retires with more kangaroo leaps and another pair of athletes appears.

Apart from the amusements, there is also much visiting done at these fairs, which afford almost the only opportunities that neighbors, who live miles apart, have of becoming acquainted with one another. This applies especially to the womenfolk, whose lives of household drudgery are dull and lonely, while the men are away on the steppes rounding up the herds.

COSTUMES OF MEN AND WOMEN ARE MUCH ALIKE

The festivals also afford them a coveted opportunity to show off their finery. The dress of both sexes is much alike, as far as shape is concerned. The main difference is that the men gird themselves with a belt, while the women allow their long garments to hang loose from shoulder to heel; hence the common word for woman in Mongol is "beltless."

The outer robe of both sexes is a wide, roomy coat, which reaches to the ground,



Photograph by Eugene Lee Stewart

A SPECIAL TYPE OF OBO USED WHEN LAMAS HOLD SERVICES FOR MONGOLIAN SOLDIERS (SEE ALSO ILLUSTRATION ON PAGE 543)

with sleeves so ample that the arms can be withdrawn from them and reintroduced without touching the buttons.

In this gown men and women are, for all practical purposes, inclosed in a little private tent from which only the head projects. It allows the wearer to dress and undress beneath it in perfect privacy, whether on horseback or surrounded by the crowded inmates of a full tent. Though on ordinary occasions wearing plain material, on high days and holidays the women don beautiful embroidered gowns often with quaint padded epaulettes.

MONGOLIAN WOMEN WEAR THEIR WEALTH ON THEIR HAIR

But the most remarkable features of Mongol costumes are the hair ornaments and head-dresses of the women (see illustrations, pages 525 and 526). Even a poor girl, once she marries, wears a profusion of silver ornaments on her head. The precise nature and shape of these varies with the tribes. One at least has a most ludicrous coiffure for its matrons, which projects so high that the cap, imperatively demanded by etiquette, is tied on above the ornaments quite clear of the head. Others adopt curtains of red corals or turquoise or strings of pearls reaching often to the waist.

When the wearers take their stand together in the picturesque veranda of some temple, the effect is most striking.

At the close of the festival, which may last two or three days, the crowds depart to their homes, sometimes hundreds of miles distant. A few must cross the Gobi Desert, that dreary stretch of sand and stones which taxes the endurance of man and beast, as mile after mile the weary camels tramp across a stretch of country where there are no tents, no wells, no inhabitants, through solitudes of sand and rocks.*

Alas for him who loses his way in a dust-storm here and wanders helplessly among the boulders, which in size, shape, color, and arrangement mock him with their resemblance to human habitations!

The more fortunate pleasure-seekers travel back across the steppes, where the noon mirages mock and beckon, where lakes glimmer and clouds on the far horizon give the illusion of mountain ranges, rendering unreal a world of beauty and of dread.

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* See "A Trip Across the Gobi Desert by Motor Car," by Ethan C. de Munyon, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1913.

THE MONGOL TENT IS MADE OF FELT

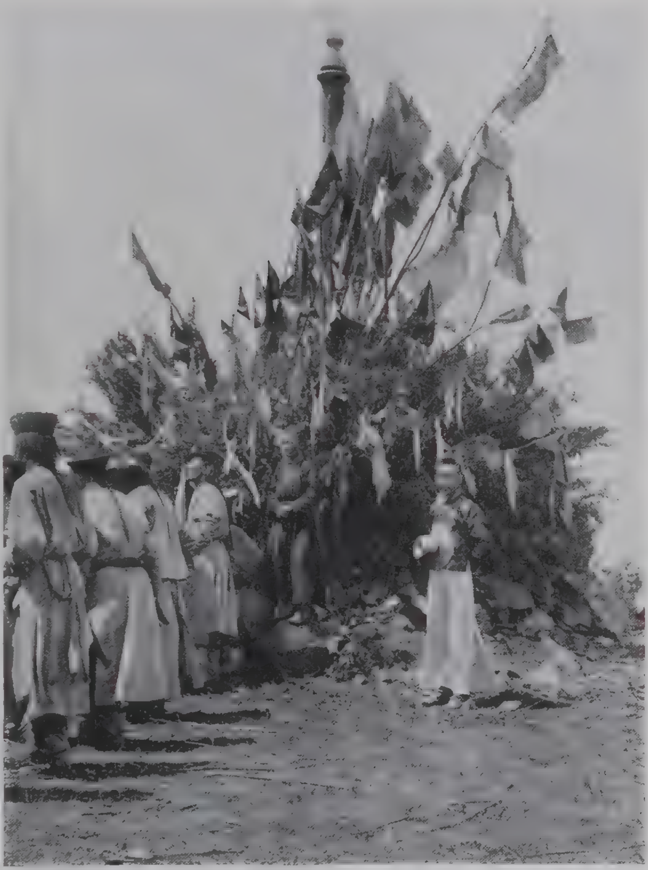
It is rare indeed that at nightfall the wanderers will find an inn, but the rule of the plain is that any traveler who demands hospitality at a tent must be lodged and fed, except in the rare cases where a tent is under prohibition because of sickness and it is therefore impossible to allow strangers to enter.

The lodging is nowhere luxurious, though the larger encampments—"ails," as they are called—have special guest tents with wooden doorways.

The average Mongol yurt is of the simplest construction (see illustration, page 550). Round a mud floor is built a trellis-work of laths about four feet high, from which a number of sticks radiate to a point at the top. These are covered with a single or double layer of felt, tied down firmly in winter by leather thongs, but raised in summer to admit the breeze.

The furnishing of the interior is equally simple. In the center is an iron fireplace, in which "argol" (dried cattle dung), the only fuel to be procured, is burned. The smoke finds its way through a hole in the roof, so much of it at least as does escape. Round the walls are a few chests and presses of the rudest Chinese manufacture and plain brass pots from Peking.

A few sheepskins and pieces of felt represent bed, sofa, and chair. Sometimes the refinements of life are represented by a basket, a pan, or a broken bowl in which half a dozen carefully-tended heads of garlic are growing.



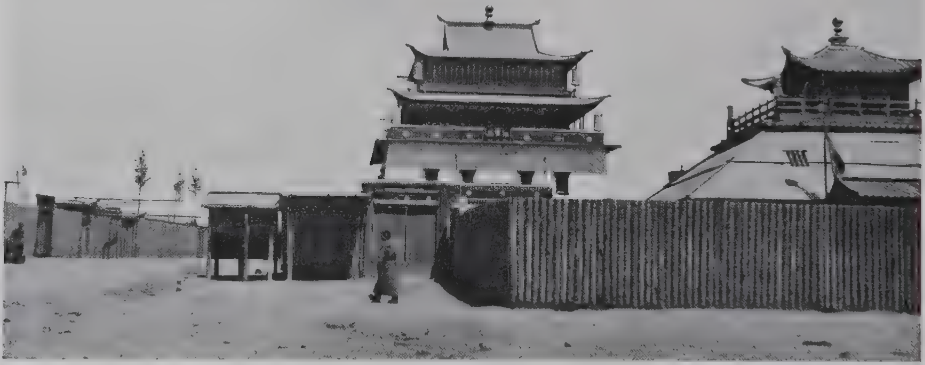
Photograph by Eugene Lee Stewart

MONGOLIAN LAMAS CONDUCTING AN OUTDOOR RELIGIOUS CEREMONY

The obo, or shrine, is built up of stones, dirt, and tree branches liberally punctuated with paper banners bearing prayers to the spirits. The meat eaten during the feasts which accompany these religious celebrations is blessed by the Lamas. The flesh which cannot be eaten is placed on the obo to appease the appetites of the spirits.

THE GUEST SLEEPS BESIDE THE LAMBS AND CALVES

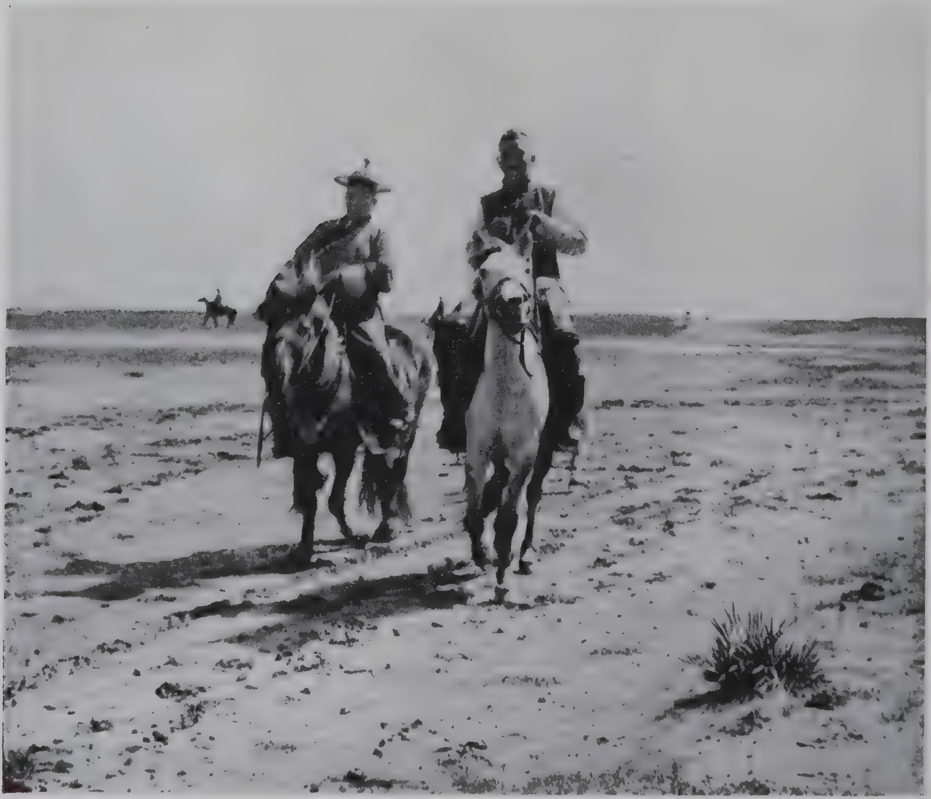
If travelers are not proud and are willing to lie down beside the lambs and calves of the household, even the poorest Mongol gives a cordial welcome and the



Photographs by Adam Warwick

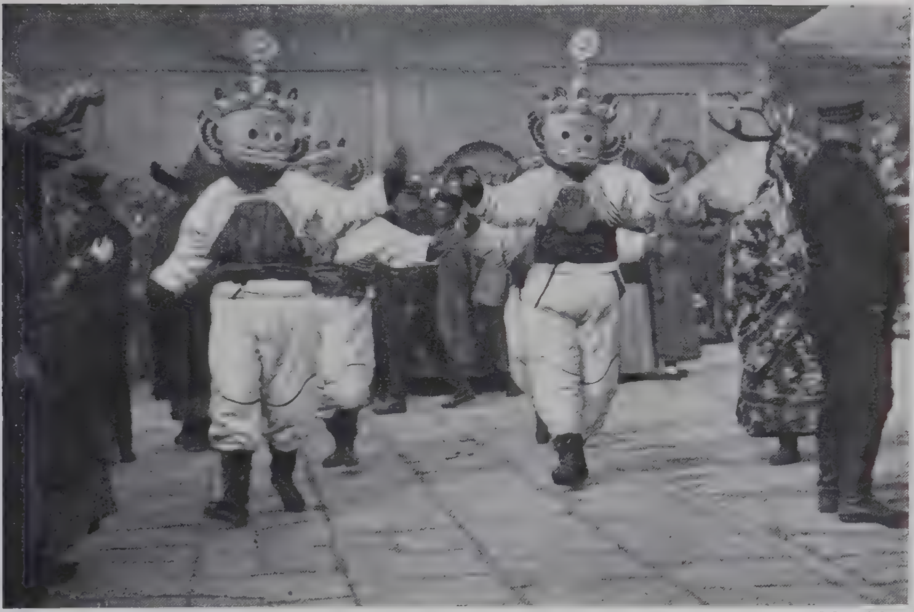
A TYPICAL MONGOLIAN MONASTERY

These establishments are not merely the centers of religion, but of amusement. The religion of the Mongols is one of terror—a revival of the morbid Indian cult of Siva.



Photograph by Eugene Lee Stewart

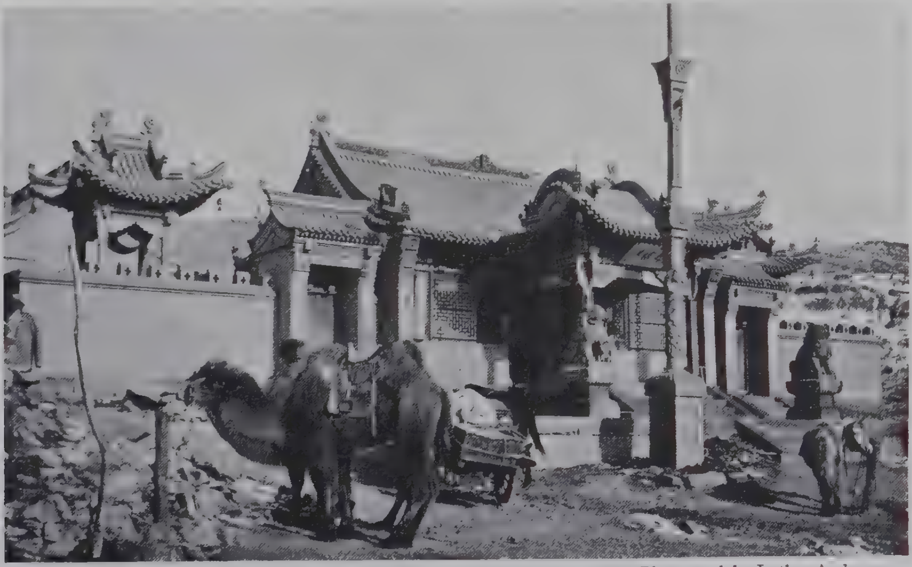
A CHIEF LAMA, IN YELLOW SILK ROBES AND BRASS HAT, AND A HIGH MONGOLIAN OFFICIAL RETURNING FROM RELIGIOUS SERVICES



Photograph by Adam Warwick

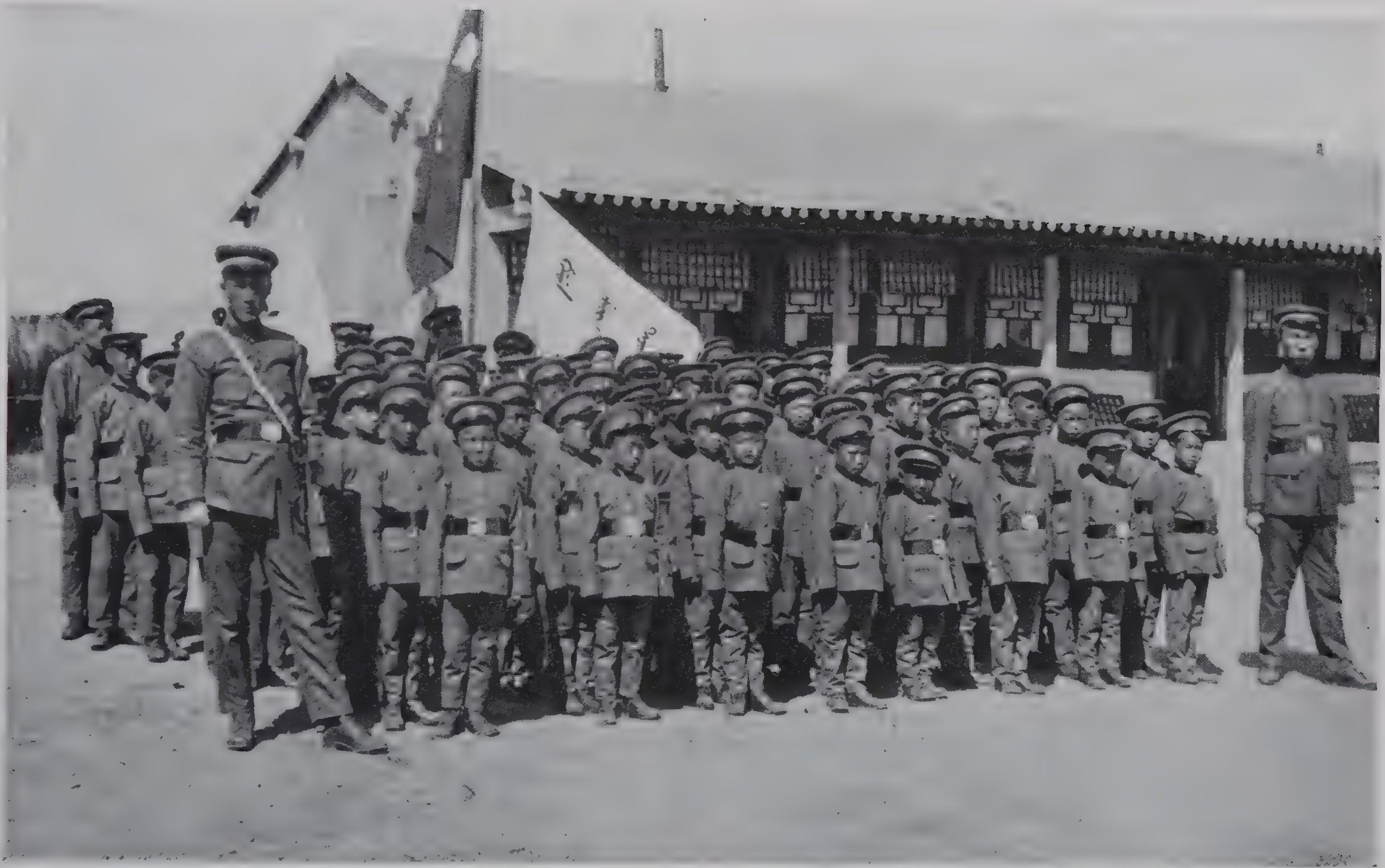
THE DEVIL DANCE, ONE OF THE GREATEST FESTIVALS OF THE LAMA CHURCH

This ceremony takes place in the spring and represents the chasing out of the Spirit of Evil. The dance consists of a series of posturings by men and boys, who wear over their heads fierce-looking animal masks (see text, page 525).



Photograph by Luther Anderson

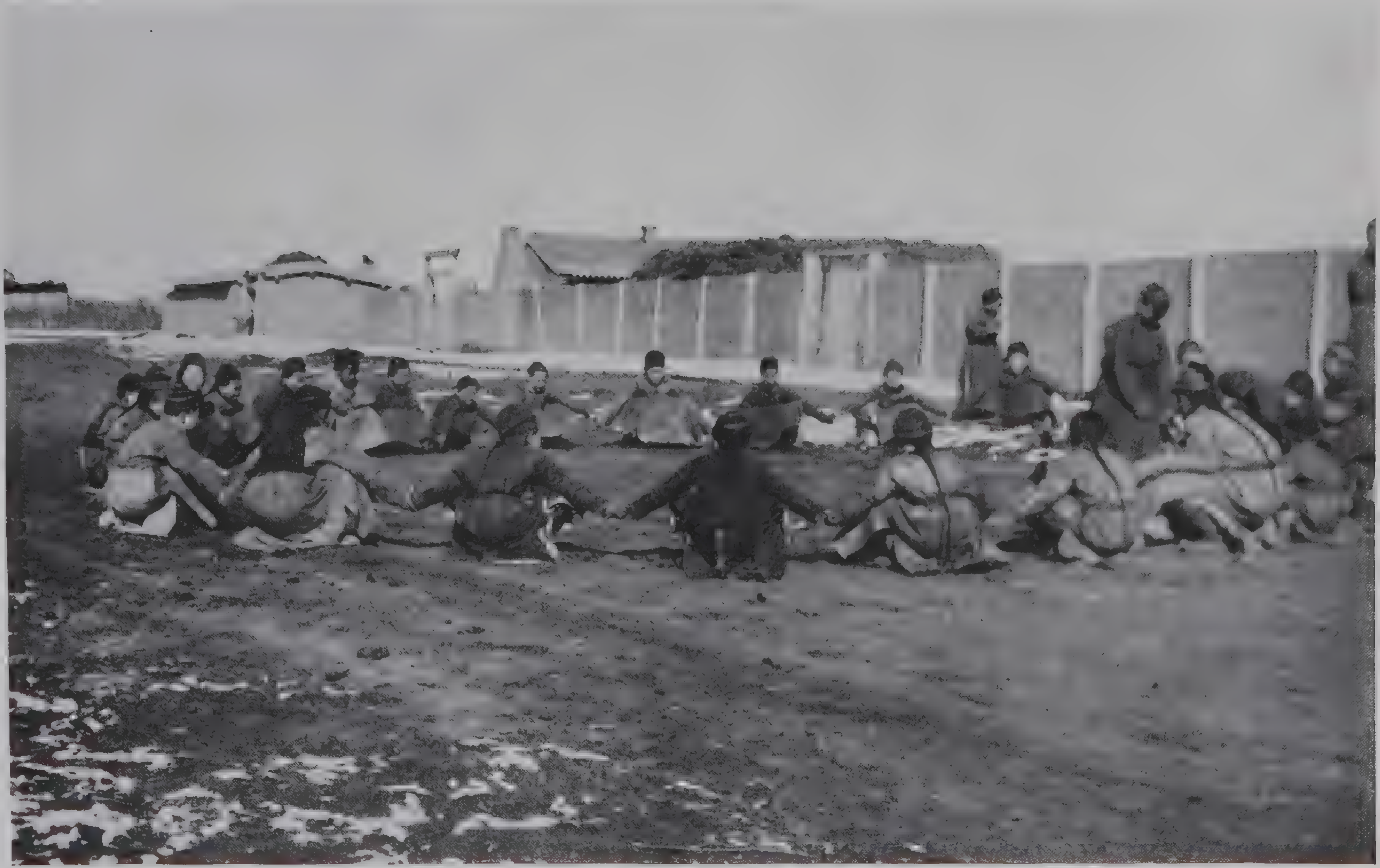
A BUDDHIST TEMPLE AT A TOWN ON THE CHINESE-MONGOLIAN FRONTIER. NOTE THE TYPE OF SADDLE ON THE CAMEL



Photograph by Eugene Lee Stewart

MONGOLIAN SCHOOLBOYS AND THEIR MONGOLIAN TEACHERS IN CHINESE MILITARY UNIFORM

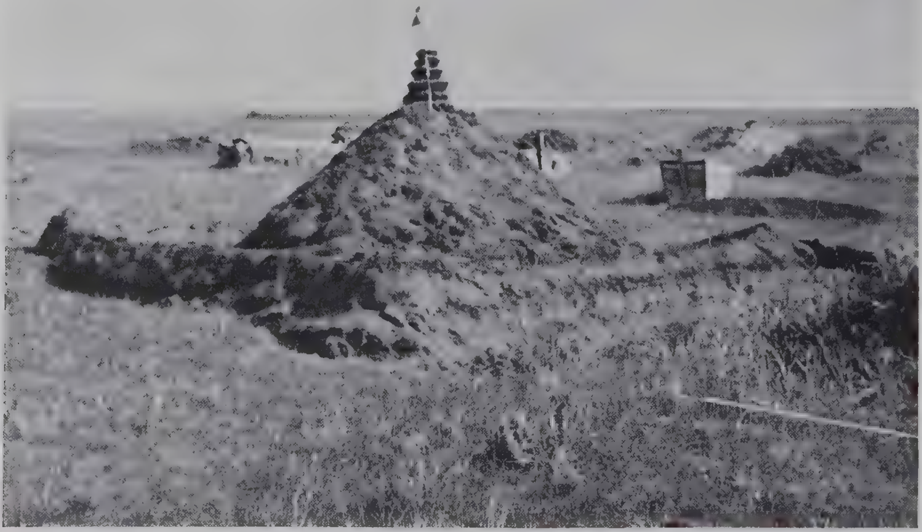
When the Mongols retired from China, the Manchus took over their rule and assumed a nominal control over Mongolia. But the Mongols were allowed to preserve their original tribal form of government. When the Manchus in turn disappeared from China, the Mongols declared their complete independence. Today, however, they are fearful of the inroads of the Chinese, whose thrifty agriculturists are already encroaching on the Mongolian steppes.



Photograph by Eugene Lee Stewart

MONGOLIAN SCHOOLBOYS PLAYING A GAME RESEMBLING OUR "BLIND MAN'S BUFF"

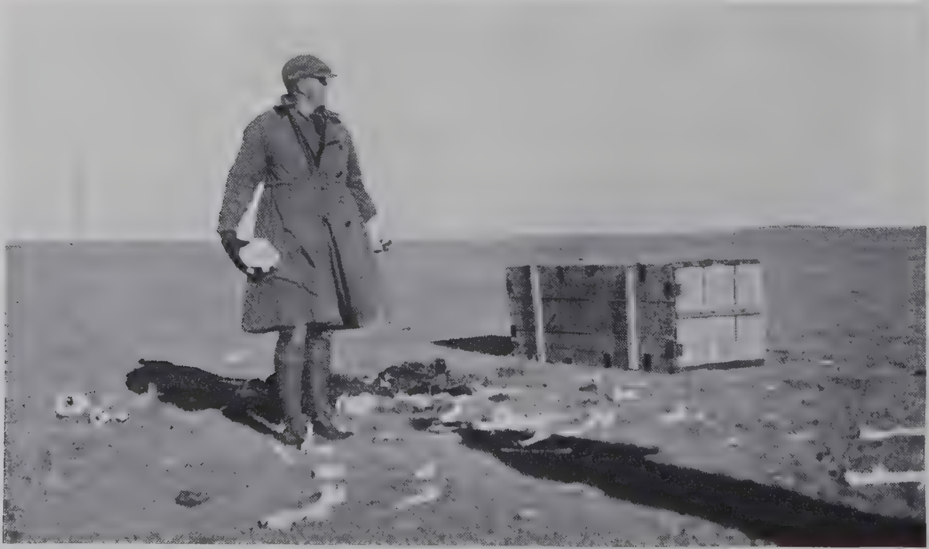
The mud wall in the background surrounds the village of Hailar, on the Trans-Siberian Railway.



Photograph by Eugene Lee Stewart

A MONGOLIAN CEMETERY

The Mongolians do not bury their dead, but set the coffin on the ground and cover it with earth, and in time the elements undo the work which has been performed to keep prying eyes away. The mound in the foreground has been recently made. Frequently the dead are merely cast out upon the steppe (see illustration below).



Photograph by Adam Warwick

HUMAN BONES WHITENING ON THE MONGOLIAN STEPPE AND A BOX CONTAINING A CONDEMNED PRISONER

While an occasional cemetery is found (see illustration above), the more customary method of disposing of the dead is to leave the bodies exposed on the plains to be preyed upon by wolves and dogs. Condemned criminals, fastened in wooden boxes, are left to die of hunger and finally to be eaten.

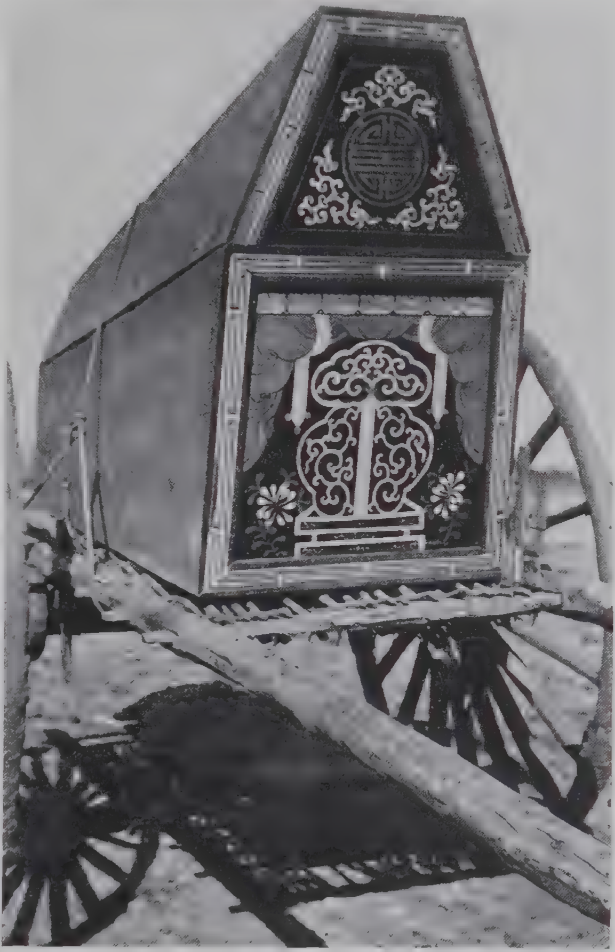
best he has. "Only observe etiquette, and every tent is yours," as the saying goes.

For even among the rough-and-ready People of the Wilderness there are a few essential rules of politeness. From whatever side a tent is approached, for instance, be sure to ride up to it from the front.

When within a short distance stop and shout "Nohoi" (dog). The Mongol dogs are very savage, and it would be dangerous to attempt to advance farther till the people of the village have come out to restrain them, which by law all Mongols are forced to do. Until they receive this protection, horsemen remain in the saddle, and those on foot keep the animals at bay as well as they can with sticks.

A Mongol dog has many wolfish qualities, and the disgusting Mongol habit of leaving corpses on the plains instead of burying them increases his savage instincts.

No white man can pass the human skulls and bones strewn over the steppes without a shudder, and he turns sick with disgust at the sight of the occasional wooden box in which a condemned criminal is left to die of hunger and finally be eaten by the wolves and dogs (see illustration, page 548).



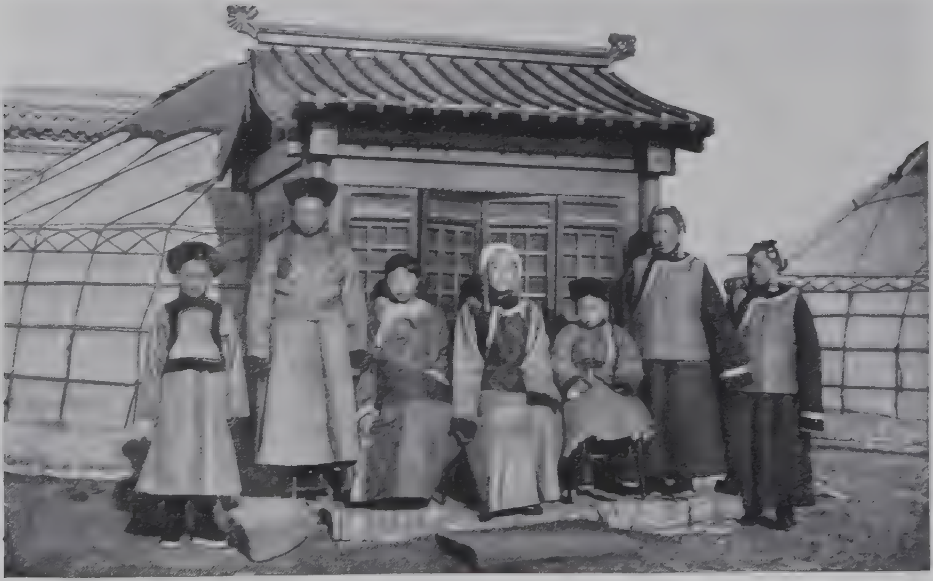
Photograph by Eugene Lee Stewart

A MONGOLIAN COFFIN, PAINTED GREEN AND DECORATED IN WHITE AND GOLD

EXCHANGE OF SNUFF BOTTLES IS A TOKEN OF HOSPITALITY

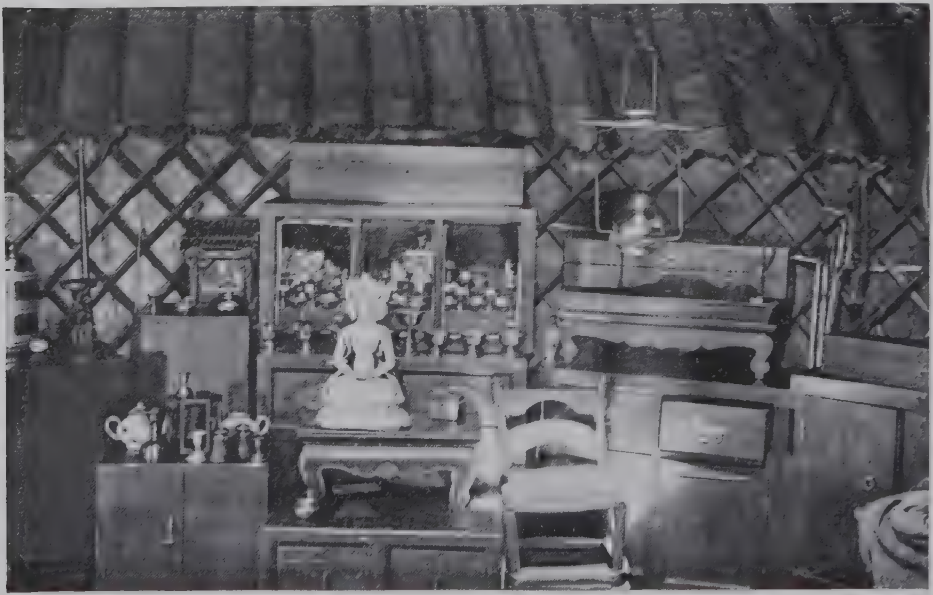
Once a stranger enters a tent, however, the savage creatures will no longer attack him; so that to bring a stick inside is considered a lack of good manners. Having left his stick outside, then, the traveler on getting through the low doorway, says "Mendu" (greeting) to the people inside and proceeds to sit down on the left side of the fireplace cross-legged or, if he cannot do this, with his legs stretched toward the door.

The next thing is the interchange of snuff bottles. A Mongol visitor offers his first to the host and the people of the tent, and receives theirs in return; but, as foreigners do not carry snuff generally, the Mongol host offers his to the foreign visitor. Meanwhile the women have been warming tea.



Photograph by Adam Warwick

A MONGOL GUEST TENT WITH WOODEN DOORWAY AND A MONGOL FAMILY GROUP



Photograph from Horace Brodzky

THE INTERIOR OF A YURT, OR MONGOLIAN TENT-HOUSE

Note the god, an American lamp, and the glass-fronted cupboard with small cups, which contain flour, cakes, tobacco, and rice—offerings to the god. A yurt is never placed where the shadow of a tree can fall upon it, for this brings bad luck. It is made of trellis and covered with felt. The fire is laid in the middle of the one room, and the smoke allowed to find its way out through a hole in the roof. When it rains, this hole is covered up, with consequences easy to imagine.

Upon request the hostess, glancing up at the hole in the roof as if to note a clock, will inquire, "Shall I make dinner?" and her lord and master, nodding [illegible], will answer, "Make it." Accordingly she proceeds to the dog-proof cage outside the door and brings in a piece of frozen meat with an ax. This is boiled with a kind of millet, and, when pronounced done, the morsels are fished out with the fire-tongs and served in a rude bowl or on a board.

TURNING IN FOR THE NIGHT

Most Mongols retire immediately after the meal, and the mother's last duty is to pile up the fire and then rest. The [illegible] guests usually [illegible] beds and [illegible] while the master of the yurt, in true Mongol fashion, indicates to the guests of the [illegible] places where the bedding is spread.

Next morning, on leaving, the traveler presents his thanks at the yurt door with a bow and a smile to the [illegible]. He [illegible] as one [illegible] and goodbye. A few days later the village [illegible] and there perhaps passed on.

Like some of our American Indians, whom they resemble, the People of the Wilderness cannot endure a settled life. All their belongings pack easily on the back of a camel: the felt-like huts with [illegible], the [illegible], the milking pails, the [illegible], and a few odd pieces of [illegible] the use all they need—except space to journey in.

What the Mongols most fear is the attempt of the Chinese to colonize their country, and they see with alarm how the [illegible] of these thrifty agriculturists are steadily encroaching on the steppe.

Photograph by [illegible]

A MONGOLIAN BOY AND GIRL, WITH LITTLE BROTHER ON BEHIND

The people of Mongolia is [illegible] and [illegible] but in [illegible] by the [illegible] of all [illegible] parts of [illegible], [illegible] Chinese [illegible] and [illegible]. [illegible] the [illegible] of this [illegible] is the [illegible] of goods. It is estimated that more than [illegible] goods and [illegible] are [illegible] in the country's [illegible].

THE NEW MAP OF ASIA

MORE than one-half the human race lives in Asia, which has an area nearly six times as large as continental United States, approximating one-third of the earth's entire land surface.

Asia boasts the world's highest peak, Mt. Everest, 29,140 feet, and the ocean's deepest pit, off the coast of Mindanao, in the Philippines, 32,088 feet. Somewhere within its borders was probably the birthplace of man, and from those fastnesses within the shadow of its Himalayas began the migrations which resulted in the peopling of all the continents and all the islands of the seas. It is a land of teeming millions of men and of vast solitudes.

There are twelve rivers on the earth's surface which exceed 2,500 miles in length, and of these six rise in and flow through Asia.

The continent extends from Cape Chelyuskin, within twelve and a half degrees of the North Pole, to the Malay Peninsula, within one and a half degrees of the Equator; and from the Strait of Bab El Mandeb, separating Arabia from Africa, to the Bering Strait, separating Siberia from Alaska, is 6,700 miles—more than a fourth of the circumference of the globe.

A MEDIEVAL EMPIRE DISMEMBERED

To the casual observer, the New Map of Asia, published by the National Geographic Society and issued as a supplement with this number of THE GEOGRAPHIC,* may not present an appearance radically different from that of pre-war Asia; and yet the world conflict on the fields of Europe has wrought vast changes here, resulting in the dismemberment of a great empire, which had come down from medieval times, the creation of five new nations, the provisional creation of four others, and the possible evolution of half a score of semi-independent states from the wreck of what were once the proud provinces that gave allegiance to the Tsar under the collective name of "Russia in Asia."

While, with the exception of the Turks, none of the ancient peoples of Asia participated in the World War to the same extent as European and American peoples, there were fewer neutral governments in the Orient than in Europe; for Siberia, as a part of Russia; India, Burma, and the suzerain states which cluster on the slopes of the Himalayas, as parts of the British Empire; Indo-China, as a part of the French Colonial Empire; Persia, as a battleground for contending armies; Arabia, China, Japan, and Siam in their own right—all were involved in the struggle.

EVERY ASIATIC NATION AFFECTED

Strictly speaking, Afghanistan and Mongolia alone of all Asia's vast dominions were untouched politically by the World War; and even these two nations were not wholly divorced from it, but were affected indirectly, as Mongolia from 1913 to 1919 was under the protection and guidance of Russia, and Britain's influence was paramount at the court of the Amir of Afghanistan.

As an ally of the Germans, Turkey by her defeat has lost not only most of her territory in Europe, but has been forced to surrender extensive and populous portions of her Asiatic empire, out of which have been set up the "independent states" of Syria, Mesopotamia, Palestine, Hedjaz, and Armenia and the autonomous province of Kurdistan.

France has assumed a guardianship (mandate) over Syria, and Britain exercises a similar office toward Palestine and Mesopotamia until such time as the three countries can be entrusted with their own affairs. Armenia, though created a separate state by the Treaty of Sèvres (the Turkish treaty), has not as yet had her boundaries definitely delimited.

Unless this treaty is radically revised, as is now contemplated, Greece will administer a large and prosperous district surrounding Smyrna, the most important port of Asia Minor, for five years, at the end of which time a plebiscite will be held to determine whether the inhabitants wish the area to be incorporated permanently as a part of Greece or resume its

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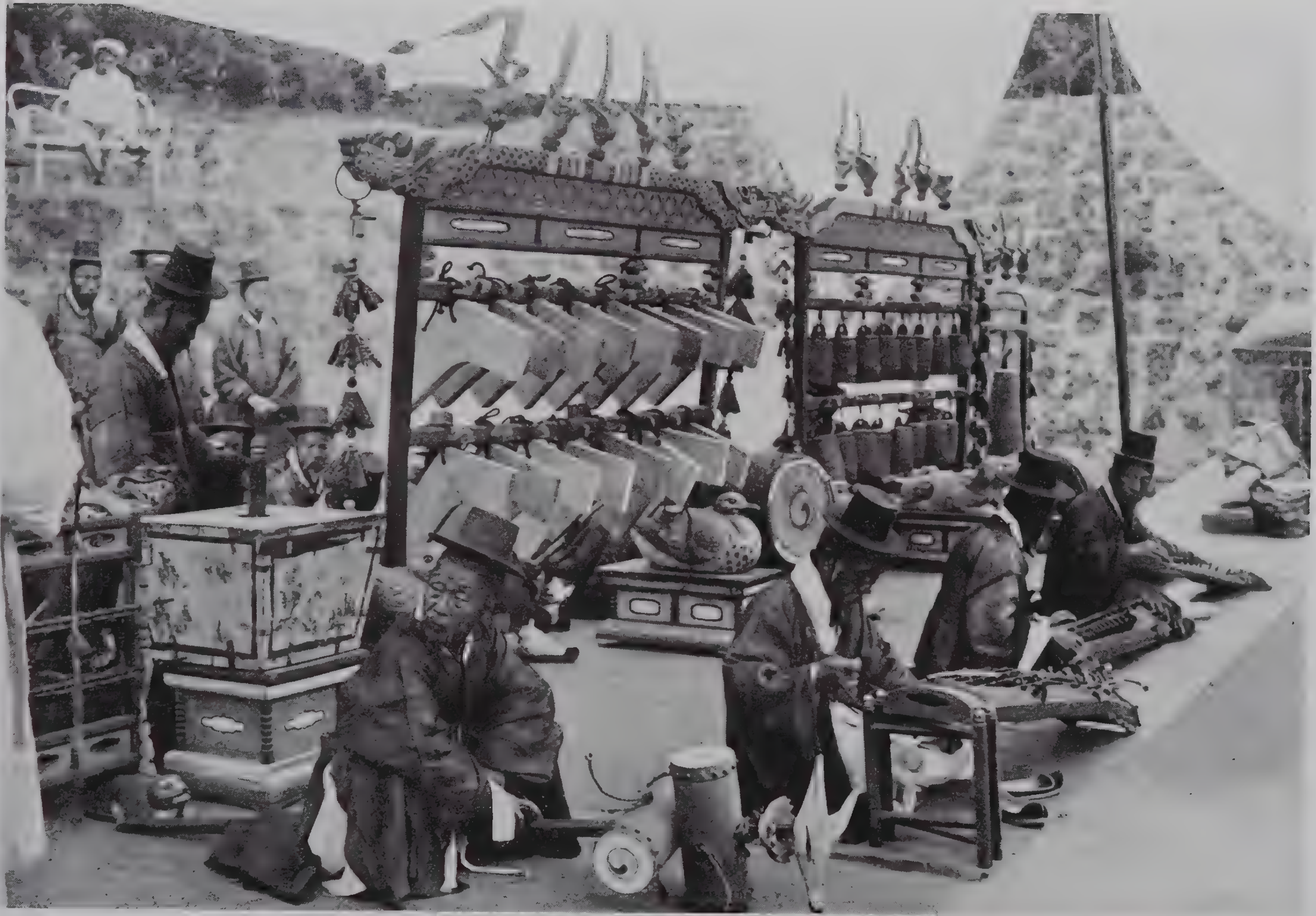
*Additional copies of the New Map of Asia may be obtained from the headquarters of The National Geographic Society in Washington. Cloth edition, $1.50; paper, $1.00.

Photograph by Plâté, Ltd.

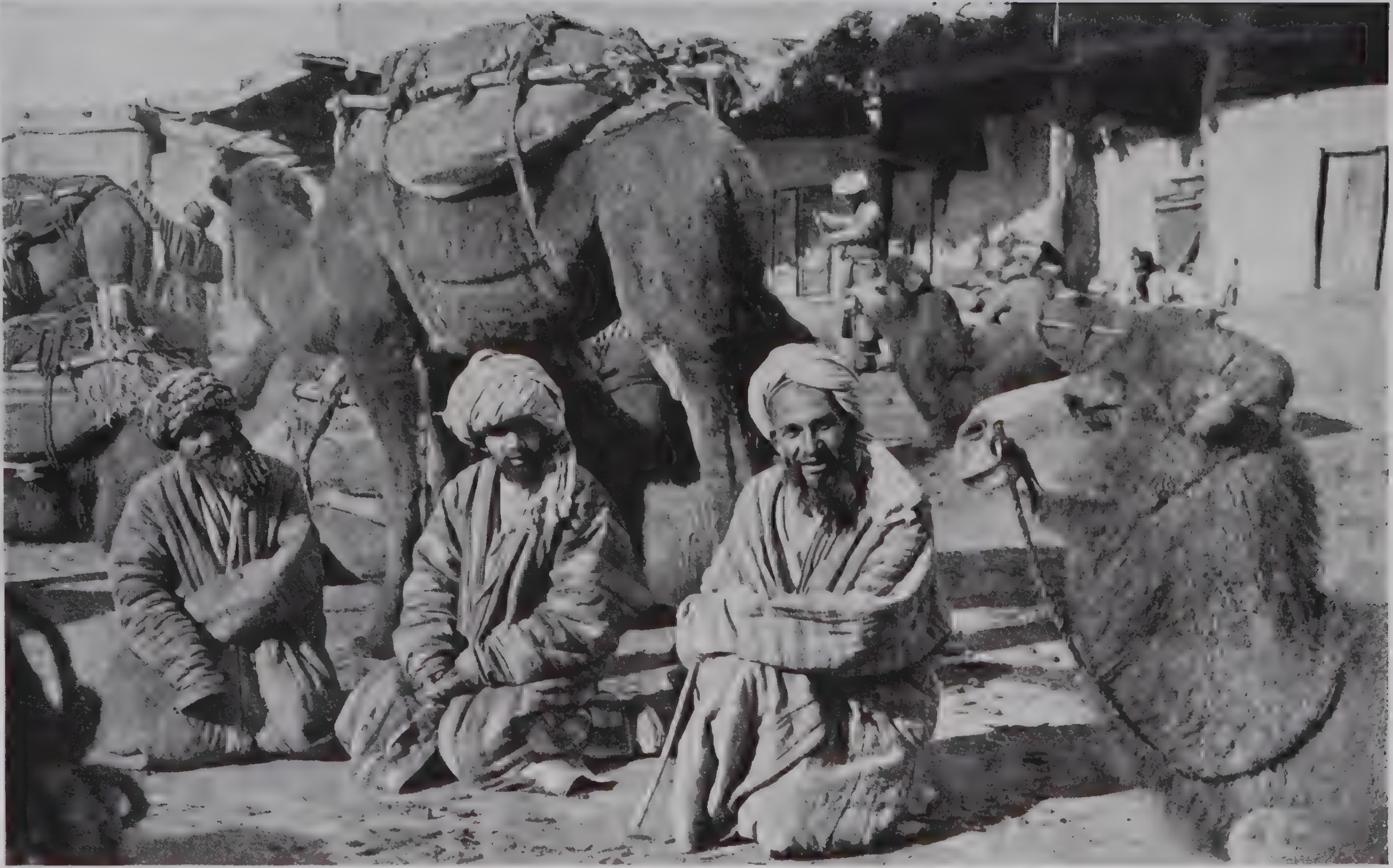
ANTISKID AIDS FOR A POPULAR CLIMB IN CEYLON

The areca, or betel palm, shown in the illustration is a versatile provider. Ivory beads are imitated in betel-nut; cordovan shades are obtained in tanning and dyeing through the use of areca catechu. One out of every ten men in the world dyes his teeth and much of his environment brick red with the astringent juice derived from chewing chopped areca-nut, wrapped in a lime-smeared leaf of the betel vine.



ALL THE INSTRUMENTS TO EQUIP A KOREAN ORCHESTRA ARE FOR SALE IN THIS SEOUL MUSIC STORE

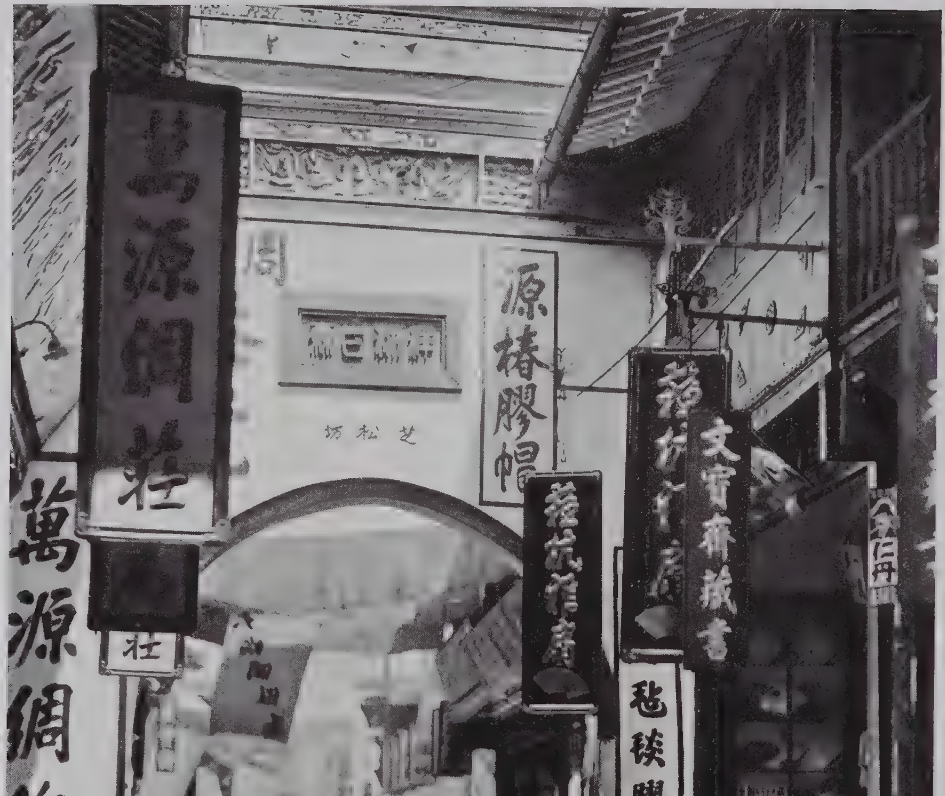
The stringed instrument which three of the shop-keepers are playing is the *komungo*. It is a sort of long, narrow bass-viol without a neck. The player plucks the strings with his right hand and fingers them with his left near the bridge. This instrument has been popular with Koreans for seventeen hundred years. There is no such thing as "time" in Korean music.



Photograph by Maynard Owen Williams

WHEN THE DESERT BURDENS ARE LAID ASIDE: A BOKHARA KHAN

Welcome as a friendly greeting after long separation is the sight of caravanserai lights at the end of the caravan trail. Samovars murmur drowsy contentment and even the disdainful camels gurgle with satisfaction. The gossip of a thousand trails weaves itself into one epic of inconsequence, and even sleep is not sweeter than the companionship of those who find themselves once more at the journey's end.



Photograph by C. H. Kragh

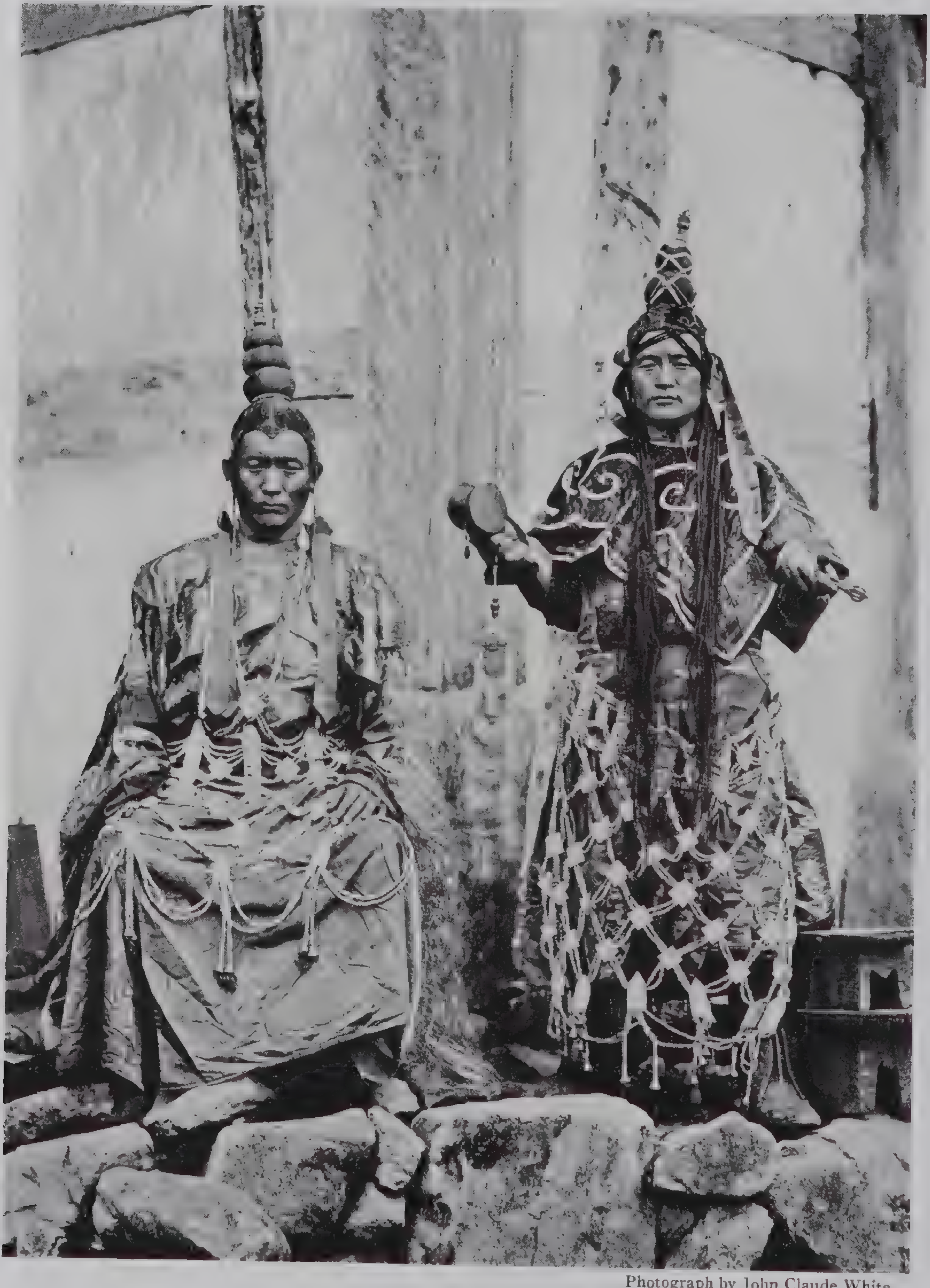
FEW CITIES OF CHINA ARE MORE PICTURESQUE THAN HANGCHOW

Fourteen centuries ago a small village of fishermen and salt-boilers occupied the site of this great city. It became the center of foreign trade in China in medieval times and was known as the "City of Heaven." Hither flocked merchants, travelers, and adventurers to enjoy the sights and indulge in its material pleasures.

Photograph from M. Branger and Sons

DISCUSSING THE NEWS OF THE DAY IN FRENCH INDO-CHINA

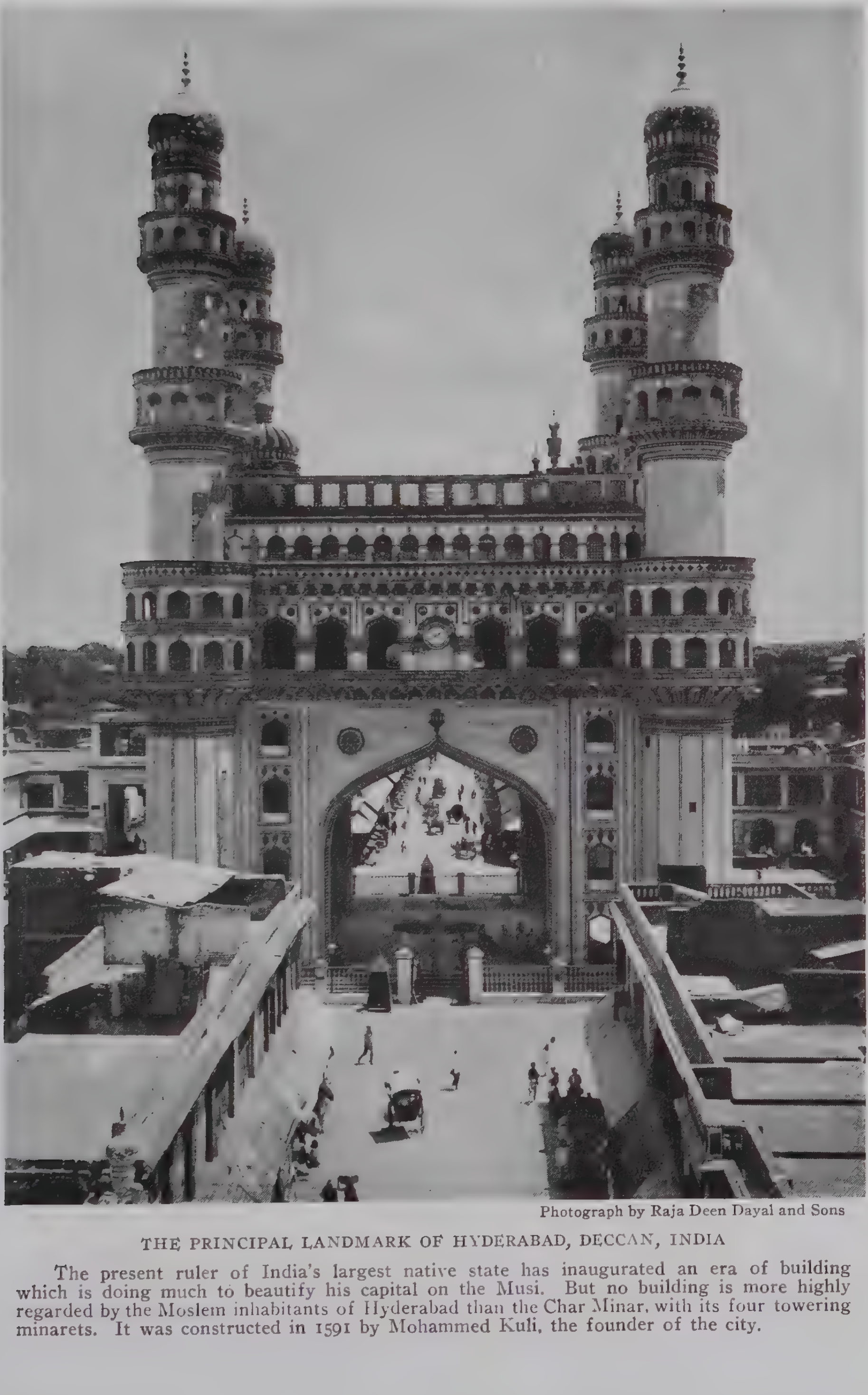
Until given the mandate over Syria, the chief interest of France in Asia lay in Indo-China, which includes the protectorates of Annam, Tonking, and Cambodia, the colony of Cochin-China, and part of the Laos country. French Indo-China has an area more than a third larger than France in Europe.



Photograph by John Claude White

THE LAMAS OF SIKKIM WEAR APRONS MADE OF HUMAN BONES

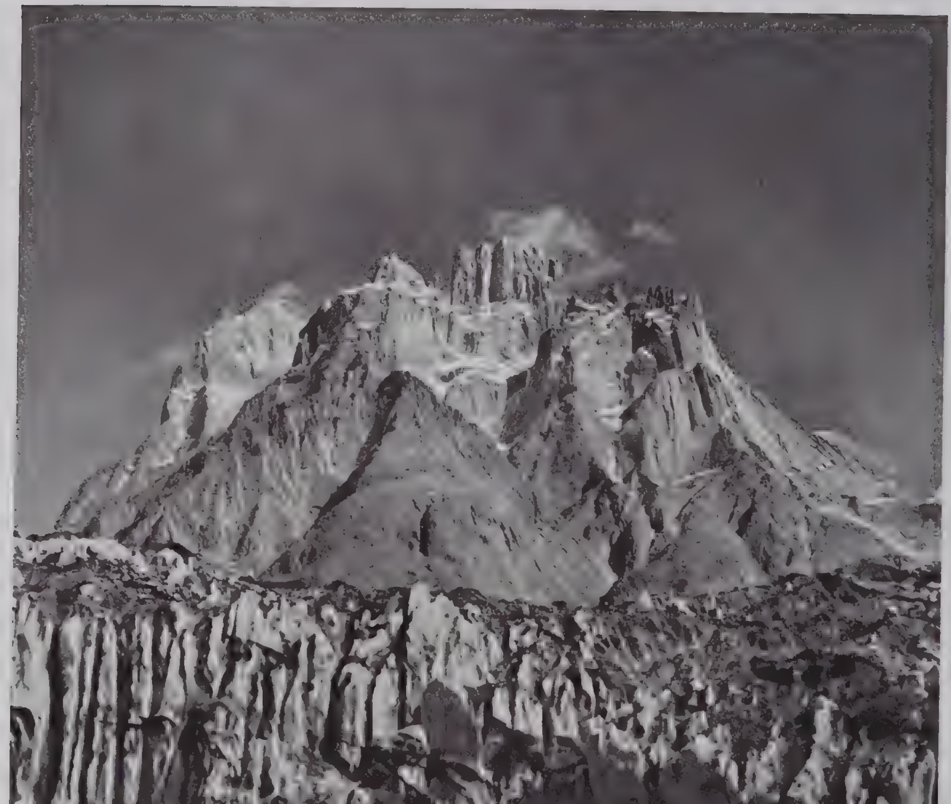
These "Rugens," as the decorative ceremonial garments are called, are worn during monastic dances. Sikkim is an Indian state, 70 miles long and 50 miles wide, in the Himalayas, between Nepal and Bhutan. The people are agriculturists and there are practically no towns or villages, each family living in a house on its own land.



Photograph by Raja Deen Dayal and Sons

THE PRINCIPAL LANDMARK OF HYDERABAD, DECCAN, INDIA

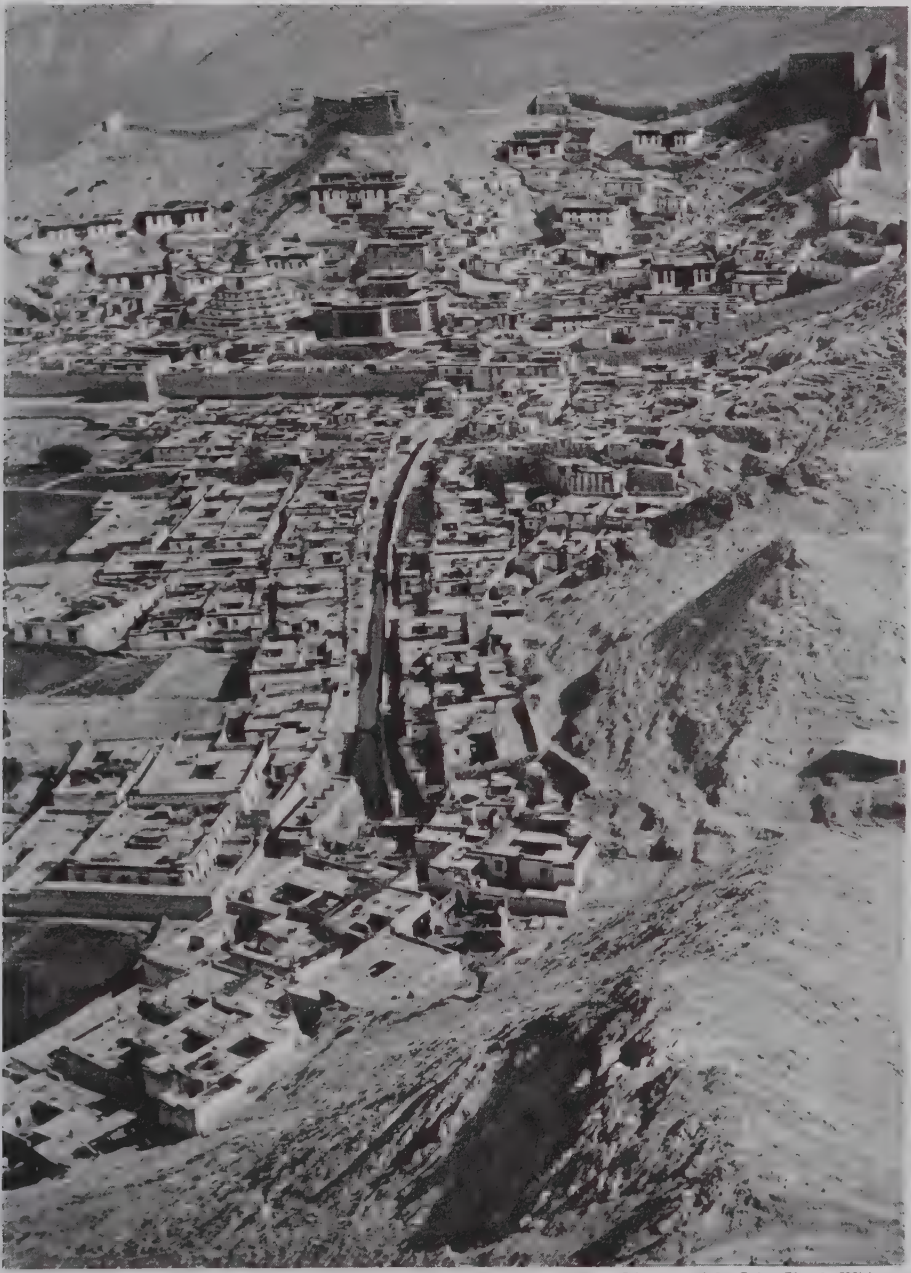
The present ruler of India's largest native state has inaugurated an era of building which is doing much to beautify his capital on the Musi. But no building is more highly regarded by the Moslem inhabitants of Hyderabad than the Char Minar, with its four towering minarets. It was constructed in 1591 by Mohammed Kuli, the founder of the city.



Photograph by Vittorio Sella

IN THE LAND OF LALLA ROOKH

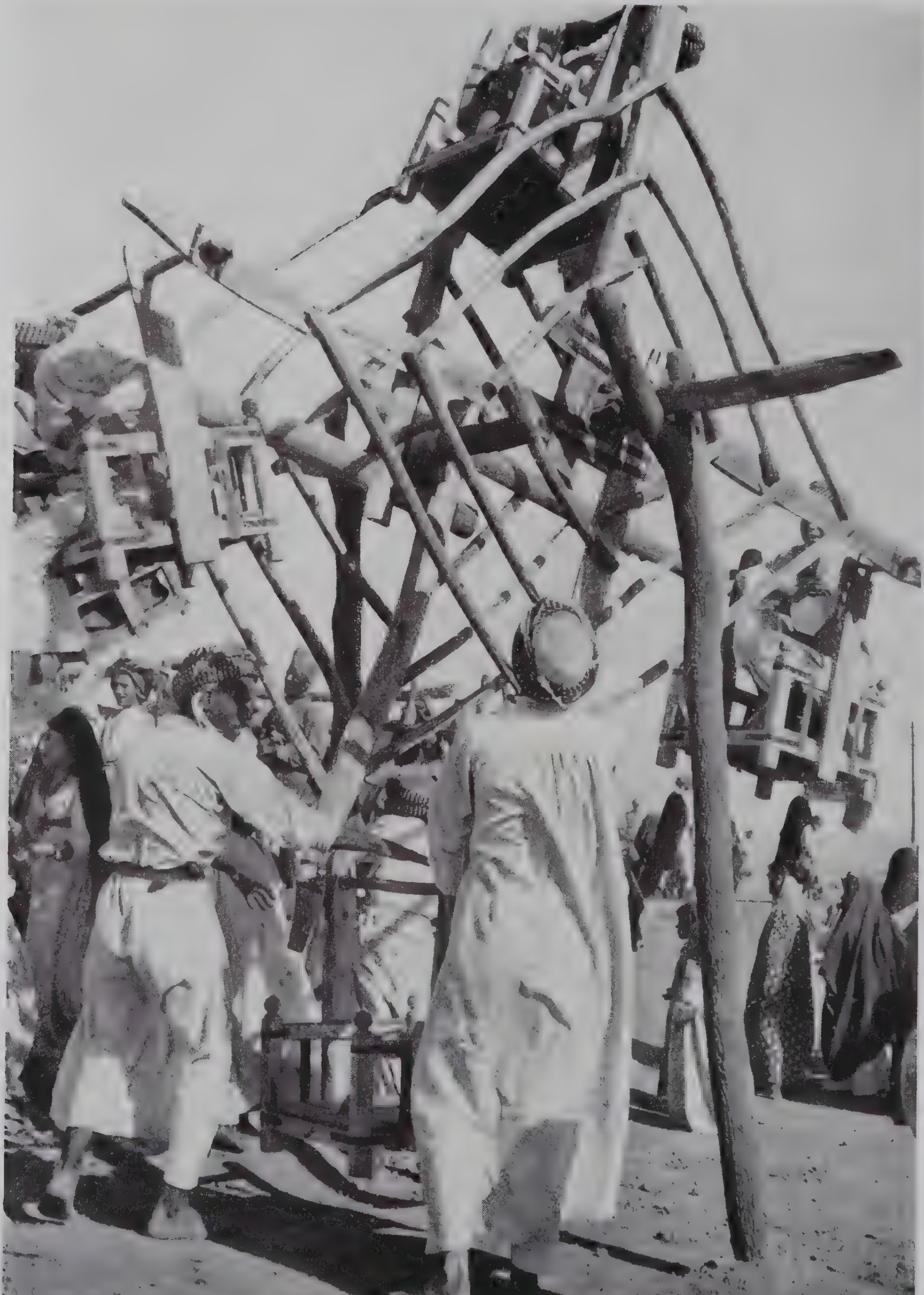
It is not strange that Kashmir, set among the serried peaks, the eternal glaciers, and placid lakes of the Himalayas, should be famed in song and story as an earthly paradise—a vale of peace and happiness. The "rose of Cashmere" has been incorporated into our language as a synonym for natural beauty.



Photograph by John Claude White

THE PALKHOR CHOIDE MONASTERY, IN THE WALLED TIBETAN CITY OF GYANTSE

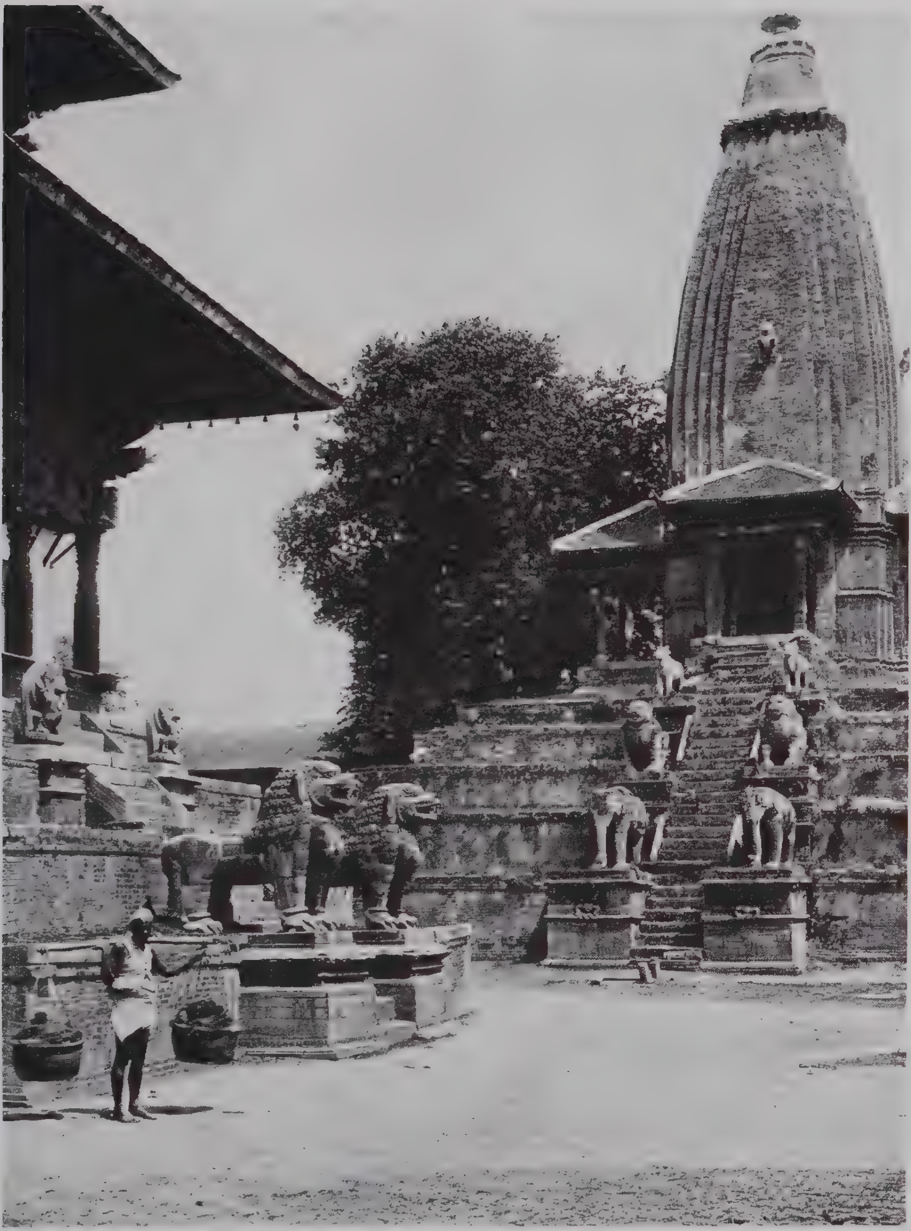
Gyantse lay in the line of the British advance into Tibet in 1904. Its jong, or fort, was considered impregnable by the Tibetans, but the attacking force under General MacDonald succeeded in hammering a breach in the walls and capturing the stronghold. This left the road open to the capital of the Dalai Lama, the Forbidden City of Lhasa.



Photograph by Eric Keast Burke

AN ARAB-MADE FERRIS WHEEL IN BAGDAD

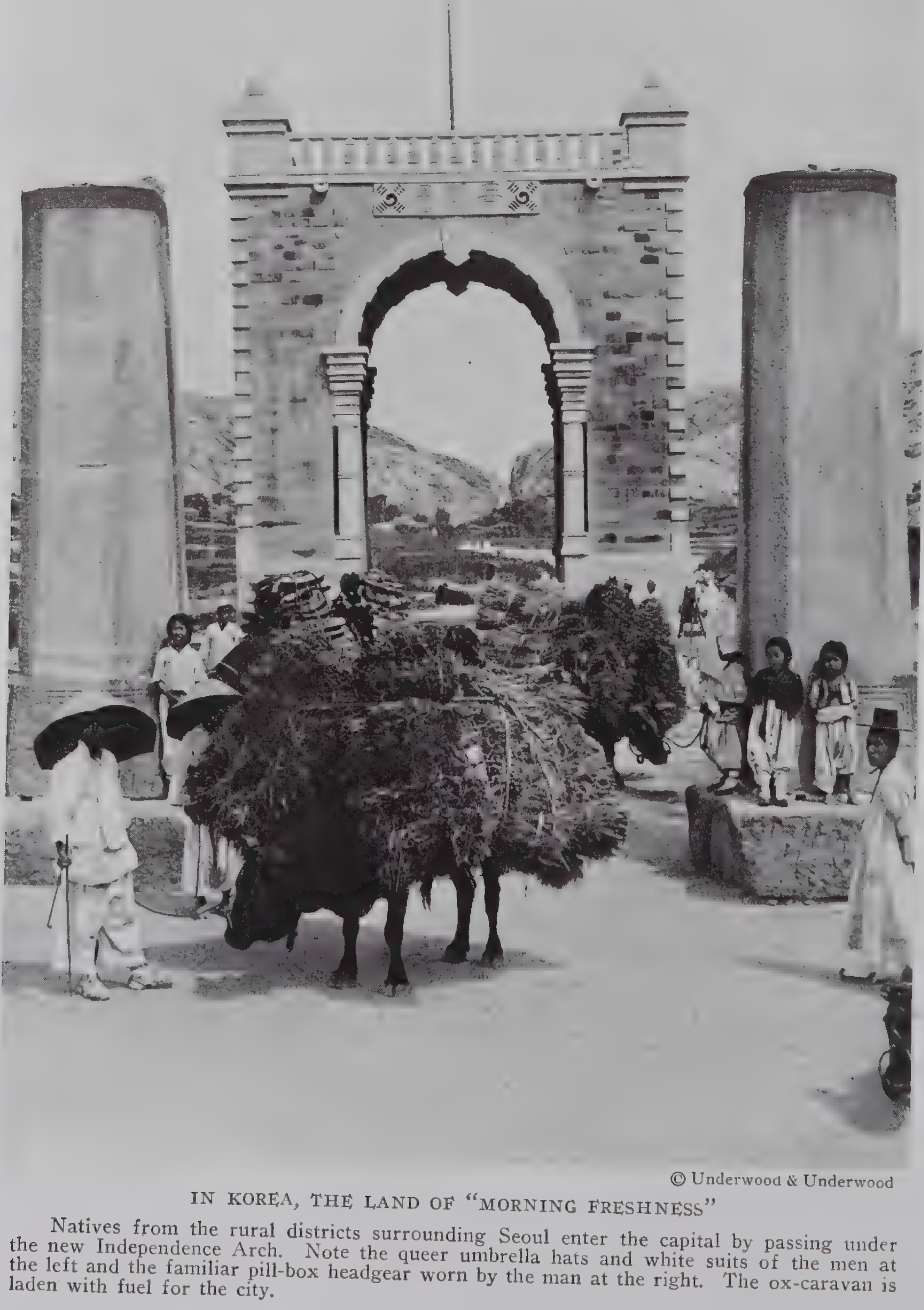
On festival occasions such crude devices spring up in the outskirts of the City of Caliphs and prove a popular diversion for Arab children. The motive power is, of course, manual. Note the similarity of these vertical merry-go-rounds to the fête wheels of Eastertide in Irkutsk, Siberia (see illustrations, pages 488 and 489).



Photograph by John Claude White

STRANGE BEASTS OF STONE GUARD THE TEMPLE STEPS AT BHATGAON, NEPAL

The Kingdom of Nepal has the distinction of owning the world's highest peak, Mt. Everest. Bhatgaon, an ancient capital city, possesses some of the most interesting shrines in Asia. Most of these are built of fine red brick. The ornamentation is generally of molded brick of the same color, with dark wood for overhanging windows and doorways.



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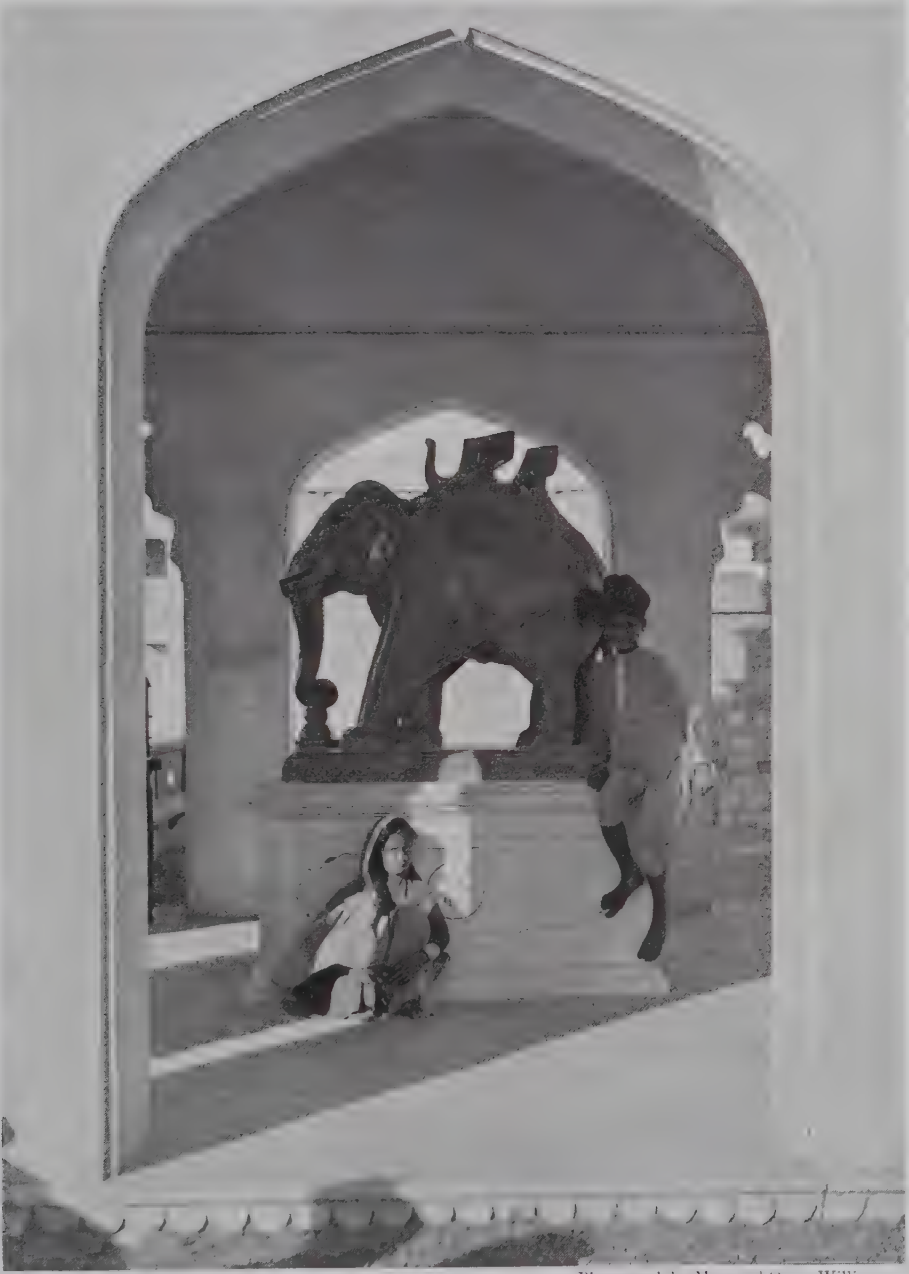
IN KOREA, THE LAND OF "MORNING FRESHNESS"

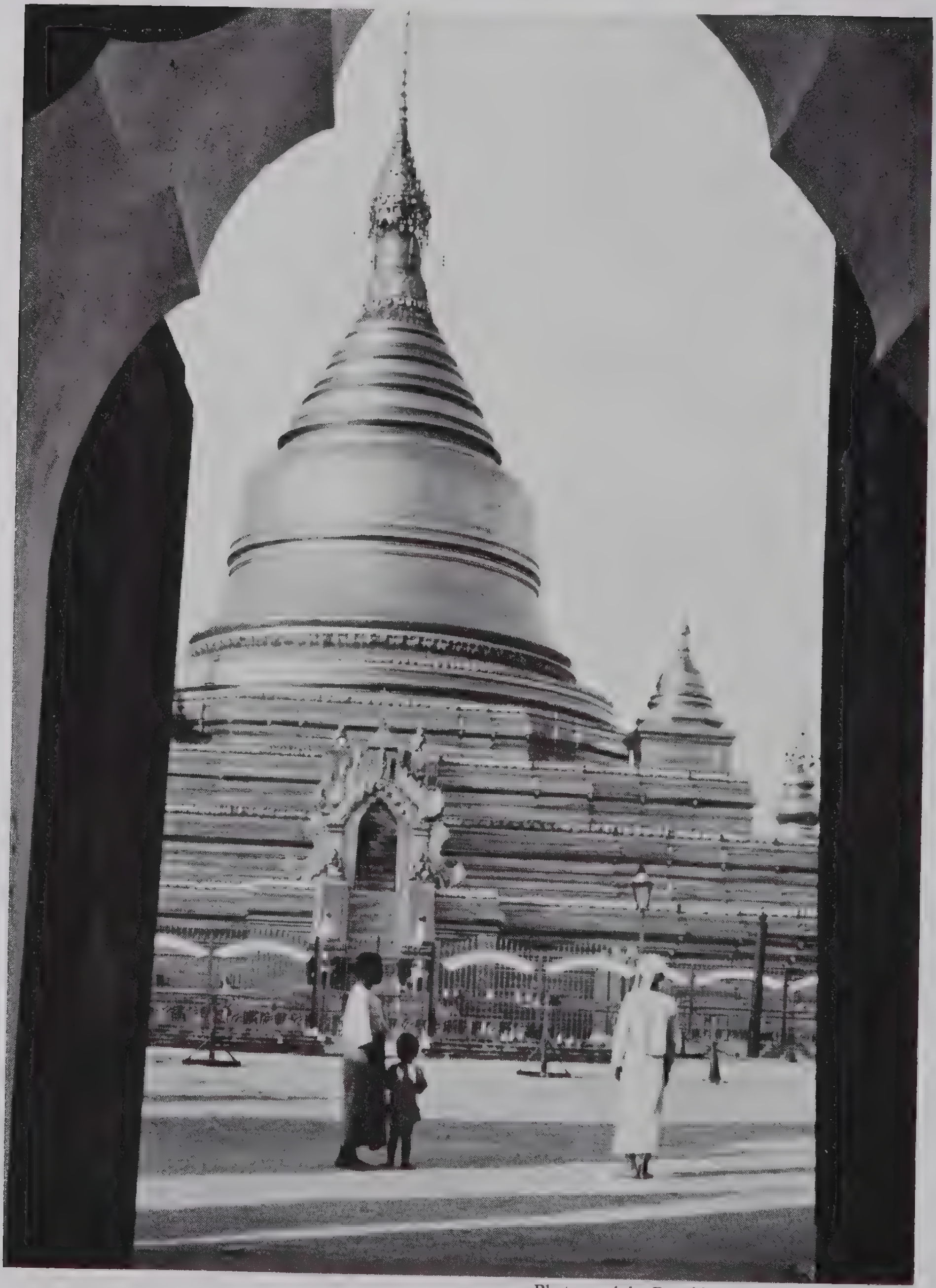
Natives from the rural districts surrounding Seoul enter the capital by passing under the new Independence Arch. Note the queer umbrella hats and white suits of the men at the left and the familiar pill-box headgear worn by the man at the right. The ox-caravan is laden with fuel for the city.



Photograph by Maynard Owen Williams

MARBLE CENOTAPH TO A FAVORITE ELEPHANT OF A MAHARAJAH

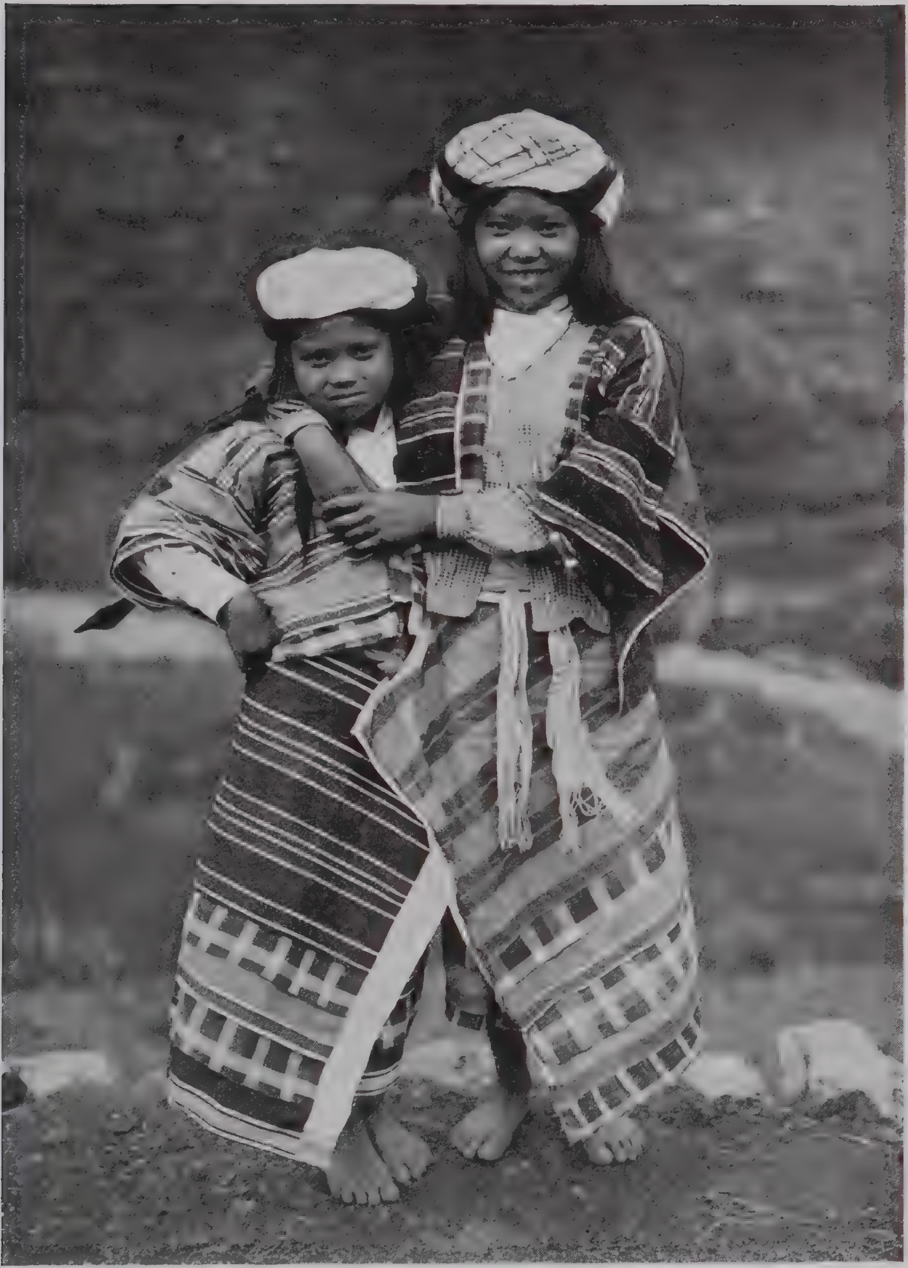
Beside the road which leads from Jaipur to the ancient capital of Jaipur State at Amber, there is, among numerous monuments to deceased wives, this costly reminder of one of the dumb servants whose faithfulness is thus rendered memorable. There are a thousand living candidates for burial in this cemetery of the Maharajah's favorite wives.



Photograph by Dr. Edward Burton MacDowell

AT THE END OF THE ROAD TO MANDALAY

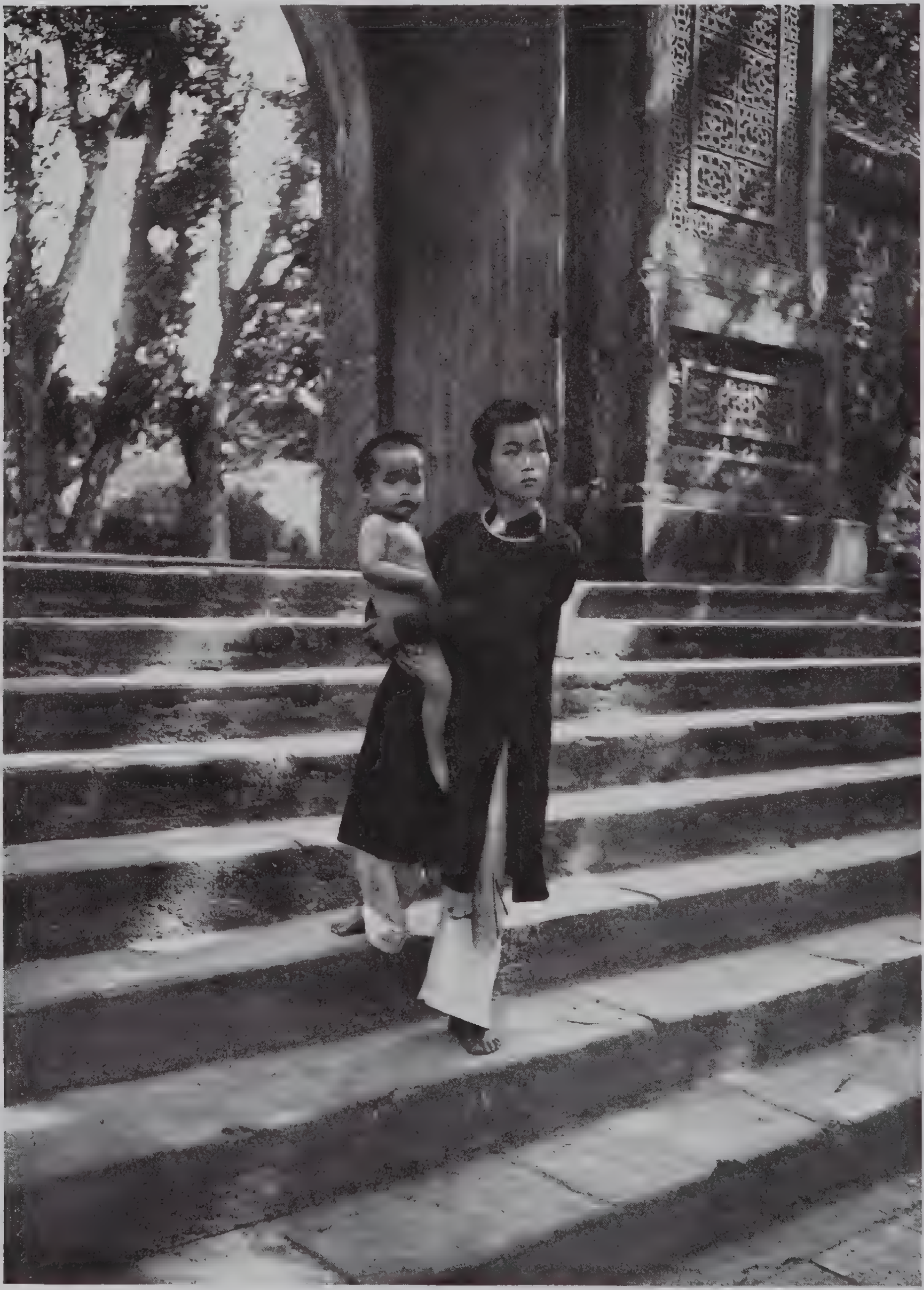
In Burma the chief objects of interest to the Western traveler are the graceful pagodas. The Burmese pagoda consists of a masonry terrace, above which rises a bell-shaped structure crowned by a "ti," or umbrella spire, formed of concentric rings of metal, from which are suspended innumerable tiny bells that sway and tinkle musically in the wind.



Photograph by Charles Martin

BENGUET IGOROT GIRLS OF THE PHILIPPINE ISLANDS

Many of the kinsmen of these gentle maids were formerly among the wildest of head-hunters in northern Luzon, but today the members of their tribe are in the main industrious and skillful farmers, planting grain and potatoes on ancient artificial terraces and successfully practicing irrigation.



Photograph from M. Branger and Sons

SUNSHINE AND SHADOW ON TEMPLE STAIRS IN ANNAM

Both the men and women of Annam wear wide trousers and long black tunics with narrow sleeves. Their country is a narrow ribbon of land, 800 miles long, on the eastern coast of the Indo-Chinese peninsula. France exercises a protectorate over the 6,000,000 natives.

former status as a part of Turkey in Asia.*

The Kingdom of Hedjaz, over which rules Husein Ibn Ali, Hereditary Keeper of the Holy Places (Mecca and Medina), extends along the northeast shore of the Red Sea, from the principate of Asir to the southwestern frontier of Palestine. It has an area about equal in extent to that of the State of Colorado and a population of some 750,000. Its capital and chief seaport is Jidda, a town of 30,000 inhabitants.

RUSSIA IN ASIA AN UNSETTLED PROBLEM

Of that vast territory formerly known as Russia in Asia, embracing Siberia, Transcaucasia, Turkestan, and the Steppes provinces, aggregating an area of more than 6,290,000 square miles (more than three times as large as Russia in Europe), but sustaining a population of only twenty-seven millions — barely four persons to the square mile—little can as yet be said with respect to its political future, and even the reports concerning its present status are vague and contradictory.

Out of Transcaucasia three republics evolved — Azerbaijan, Georgia, and, in part, Armenia. Their existence was tempestuous and short-lived. Whether, when the tide of Bolshevism recedes, they will be able to establish their interdependence as a Transcaucasus governmental trilogy none can say. The boundaries indicated on the accompanying map are merely indicative of their approximate extent as originally conceived.

For a speculative discussion of the possible future of the "United States of Siberia and Russian Turkestan," the reader is referred to the admirable article by Viscount Bryce, under the title "Western Siberia and the Altai Mountains," in this number of THE GEOGRAPHIC (pages 469 to 507).

JAPAN ASSUMES KIAOCHOW LEASE

The transfer of German treaty rights in the Chinese province of Shantung (Kiaochow and Tsingtao) to Japan is a cause celèbre of recent diplomatic history. The town, harbor, and district of Kiaochow, embracing an area of some 200 square miles, exclusive of the bay, which has an area of an additional 200 square miles, were seized by Germany in November, 1897, and in the following March were transferred by treaty to the latter under a 99-year lease. A month later the district was declared a protectorate of Germany and remained as such until November, 1914, when it was captured and occupied by Japanese forces.

Despite China's contention at the Paris Peace Conference that there should be a restitution of this leased territory to her, together with a cancellation of all Germany's economic privileges, by the Treaty of Versailles the "lease" was transferred to Japan on the ground of conquest. It was for this reason that China refused to become signatory to the treaty with Germany, and the whole question constitutes in Asia a "sore spot" similar to the score or more which now pock-mark the face of the political map of Europe.

Before the influx of the Japanese, the Kiaochow district had a population of about 200,000. Surrounding the district and bay is a so-called neutral zone of about 2,500 square miles, with 1,200,000 inhabitants.

AMERICA'S INTEREST IN YAP

In addition to her acquisition of the Kiaochow leased district, Japan's spoils from the World War include the formerly German-owned Marshall Archipelago, the Marianas or Ladrone Islands, the Pelew Group, and the Carolines, including the much-discussed Island of Yap, important from an American standpoint as a connecting link for cables between San Francisco, Hawaii, Guam, the Philippines, China, and the Dutch East Indies.

The Carolines consist of 500 coral islets, supporting some ten thousand inhabitants; the Pelews are about twenty-six in number, with 3,000 natives; and the fifteen Marianas have 2,600 inhabitants. The Marshalls consist of two chains of some twenty-five lagoon islands, supporting a population of 15,000.

When the American Pacific cable was laid, at the beginning of the twentieth century, from San Francisco to the Philippines by way of Hawaii, the Mid-

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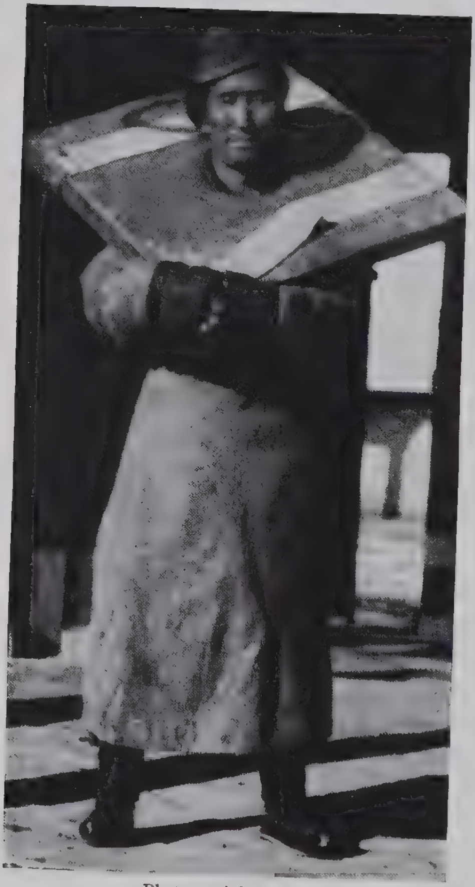
* See also "The New Map of Europe," in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1921.



Photograph by Eugene Lee Stewart

A MONGOLIAN HORSE THIEF SERVING A THREE MONTHS' SENTENCE

The wooden collar, which is bolted together to make certain that it will not come off, is not removed during the three months, and the prisoner gets what rest he can by sitting down and leaning back against a post or wall. On the white strips of cloth is written in Mongolian an account of his crime. During the daytime he is obliged to keep himself on display in front of the prison (under guard), so that his fellow-men may observe the penalty for stealing horses (see pages 507-551).

way Islands and Guam (7,846 miles), a branch line was laid from Guam to Yap. From the latter, lines now radiate to Japan, to Shanghai, and to the Dutch East Indies.

Yap is intrinsically interesting as well as commercially important. The westernmost of the Western Carolines, it is situated some 500 miles southwest of Guam and 800 miles east of Mindanao, of the Philippine group. The arrival of Australian troops in October, 1914, prevented the Germans from erecting a wireless station here, which would have been of great service in communicating with the commerce raider *Emden*, then abroad on the highways of the Pacific.

Although surrounded by an atoll, Yap is of volcanic origin. Its only good harbor is Tomil Bay. Its pseudonym, "the Island of Stone Money," is derived from the fact that native wealth is reckoned in pounds or tons of limestone discs, brought from Babeltop, 300 miles distant. A single "coin" four feet in diameter is said to represent a value of 10,000 coconuts. The coconut is the unit of value, for copra is the only article of export.

THE EAST IS NO LONGER "CHANGELESS"

The natives of Yap, some 7,000 in number, are safely catalogued as Micronesians, a term which embraces a variety of peoples of Melanesian, Polynesian, and Malaysian stocks. They have light coffee-colored skins and wavy black hair, dark eyes, and prominent cheek-bones, and are neither as tall nor so strongly built as the natives of Samoa, the Fiji Islands, or Tahiti. They are a docile, kindly, indolent people.

Two portentous agencies are at work in the Orient, and until they become relatively quiescent, political boundaries throughout the great continent will be "subject to change without notice." One of these is the disruptive force in peasant Russia, now felt not only in Siberia, in Russian Turkestan, and in the Transcaucasus, but also in Persia. The other is Japan, whose natural desire, based on need for territorial expansion, has resulted in a reaching out into China and eastern Siberia and into the islands of the Pacific north of the Equator.

Asia is no longer the "Changeless East"; it is the Continent of Ceaseless Change.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your July number, the Society should be notified of your new address not later than June first.*

VOL. XXXIX, NO. 6 WASHINGTON JUNE, 1921

THE NATIONAL GEOGRAPHIC MAGAZINE

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ACROSS THE EQUATOR WITH THE AMERICAN NAVY

BY HERBERT COREY

AUTHOR OF "ON THE MONASTIR ROAD," "COOTIES AND COURAGE," "SHOPPING ABROAD FOR OUR ARMIES IN FRANCE," AND "A UNIQUE REPUBLIC, WHERE SMUGGLING IS AN INDUSTRY."

"WHY do you ask questions about the ships?" inquired the commander. "A navy isn't ships. A navy is men."

During the winter of 1920-21 I accompanied the American battleship fleet on its winter cruise. The Atlantic fleet of seven battleships and eighteen destroyers, commanded by Admiral H. B. Wilson, with the accompanying auxiliary vessels of its train, joined the precisely similar Pacific fleet under Admiral Hugh Rodman at Panama. The combined fleets cruised together to a short distance south of Callao, Peru. There they separated, the Atlantic fleet turning back to pay a visit of ceremony to the Republic of Peru, while the Pacific fleet continued on to the Republic of Chile.

Then a juncture of the fleets was again effected and they cruised in company to Panama, where the annual inter-fleet athletic competition was held. En route literally every moment possible was occupied in the practice of maneuvers.

ON SHIP DRILL DEPENDS WAR-TIME VALUE OF THE FLEET

Upon the degree of perfection reached in these ship drills depends in great part the war-time value of the fleet. It will not have been forgotten that in the battle of Jutland Admiral Scheer saved the German fleet because he was able to execute perfectly an evolution which naval authorities had declared impracticable in the hour of battle.

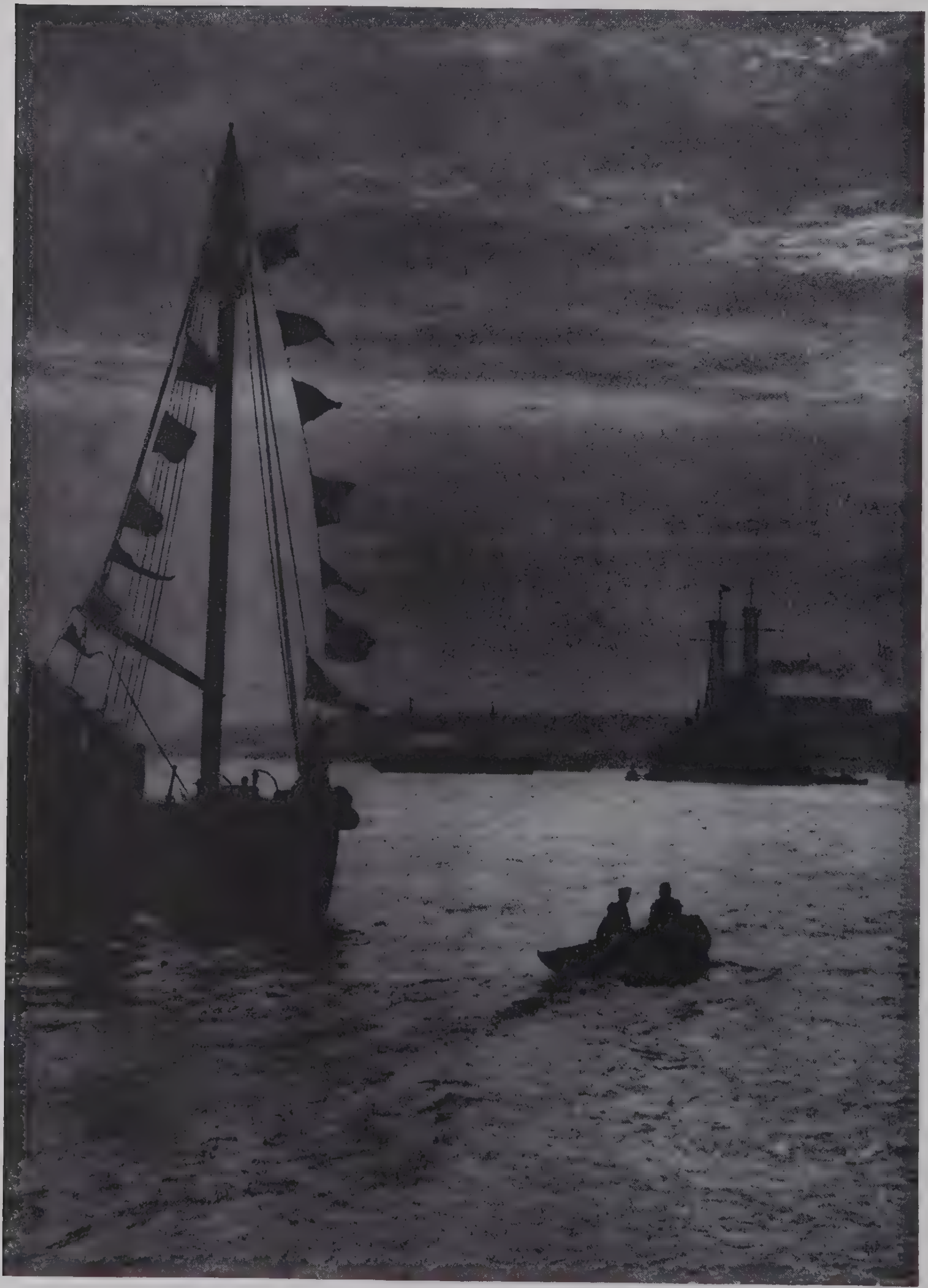
Upon the second separation, the two fleets left for their winter practice grounds, on opposite sides of the continent.

MAKING A GOOD SAILOR A BETTER AMERICAN

Throughout this period of close association I was over and over again impressed with the truth of the statement quoted. It is the conviction of the leaders of the American Navy that "a navy is not ships. It is men." They bend every effort toward the production of a personnel of extraordinary intelligence. They do their best to provide them with the best ships and guns and submarines and air-craft that can be built. But they hold fast to their guiding principle, that the material elements of the navy are but the instruments through which the genius of the men can be expressed.

Because the American enlisted man does not, as a rule, care to serve more than one term afloat, the navy's efforts have been extended over a wider field than those of other countries.

The American is made into an excellent sailor, as a matter of course; but it is likewise the navy's effort to make him into a better American. With this end in view, he is offered every opportunity to gain an education; he is taken on



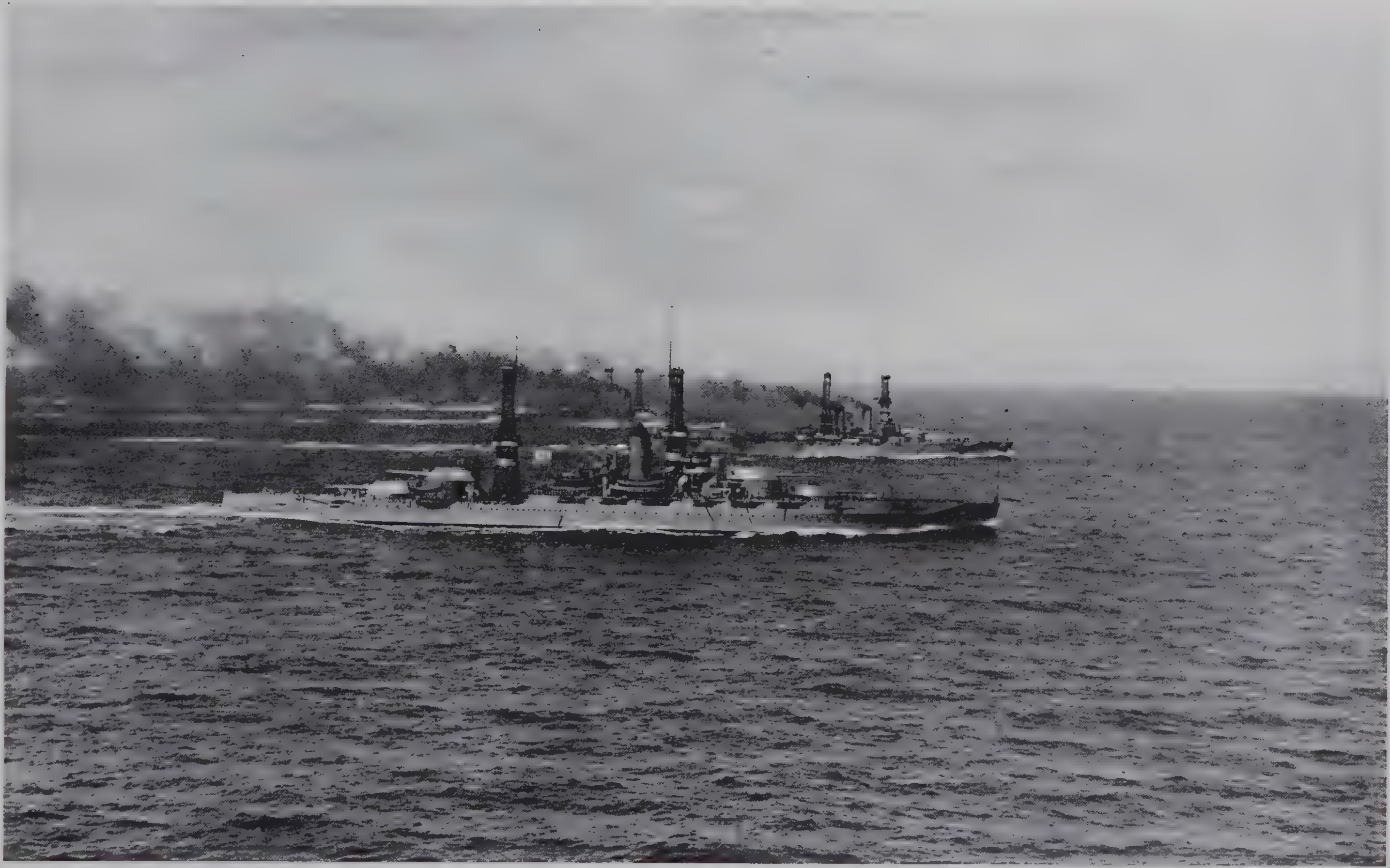
Photograph from Edwin Levick

ONE OF THE AMERICAN NAVY'S FLOATING FORTRESSES SEEN BY MOONLIGHT

Each officer of the United States Navy has a pet story to prove that the American is the smartest sailor and best fighting man that ever crawled into a turret.

A "BOAT," ITS "GOBS" AND ITS OFFICERS

In the lingo of the sea, a destroyer is always referred to as a "boat," while the enlisted men of every naval craft are "gobs" (see text, pages 581 and 594). In the center of the front row of officers (seated) is Commander Byron McCandless, co-author of THE GEOGRAPHIC'S famous Flag Number. During the World War, Commander McCandless was in command of this destroyer, the *Caldwell*.



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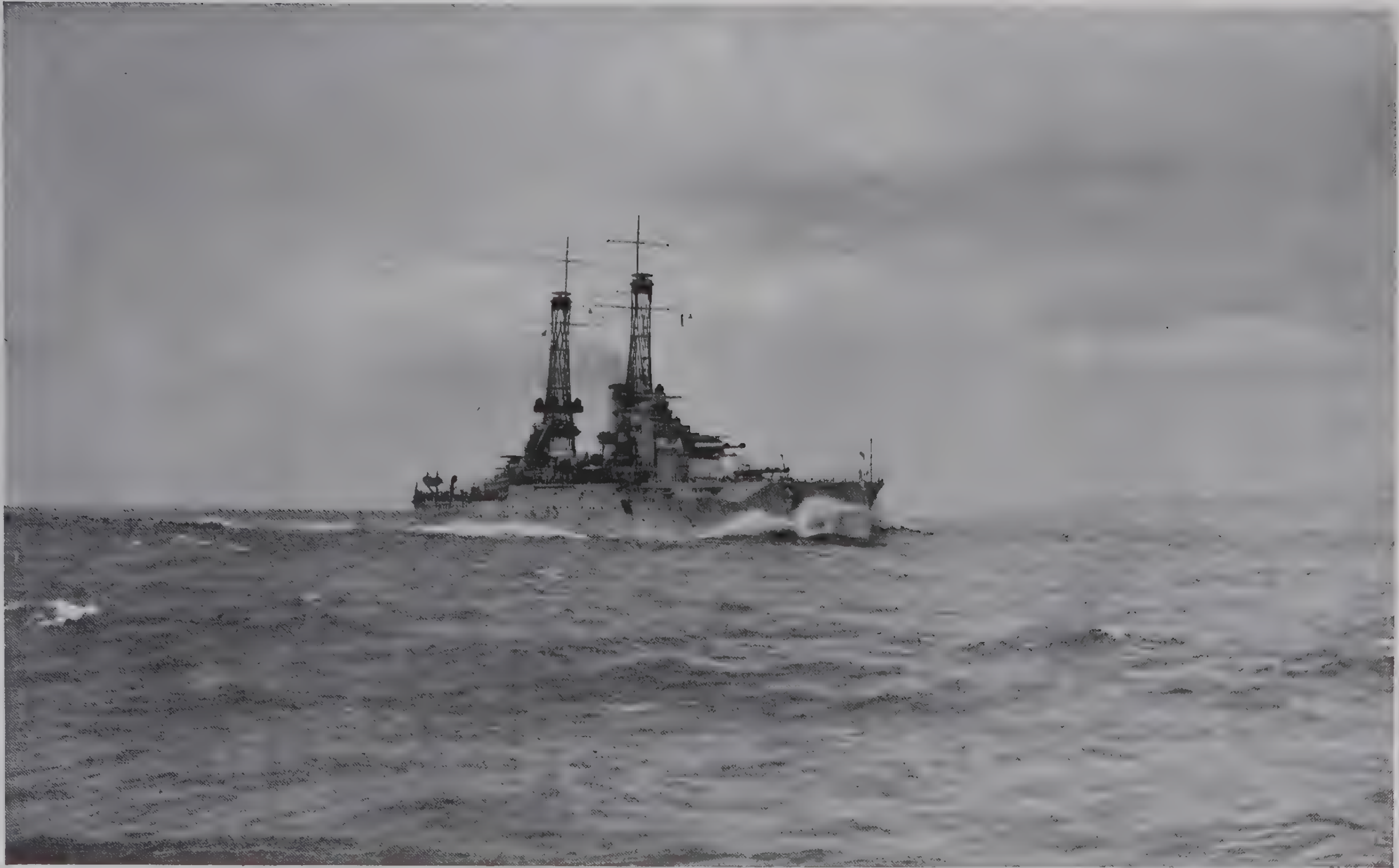
SUPERDREADNOUGHTS OF THE ATLANTIC FLEET IN LINE-ABREAST FORMATION DURING MANEUVERS AT SEA

The *Arizona*, nearest the camera, and its sister ships, the *Idaho, Mississippi, New Mexico, Pennsylvania*, and *Tennessee*, constitute the most powerful units of the United States Navy. The first battleship equipped with 16-inch guns, the *Maryland*, goes into commission this month (June, 1921).



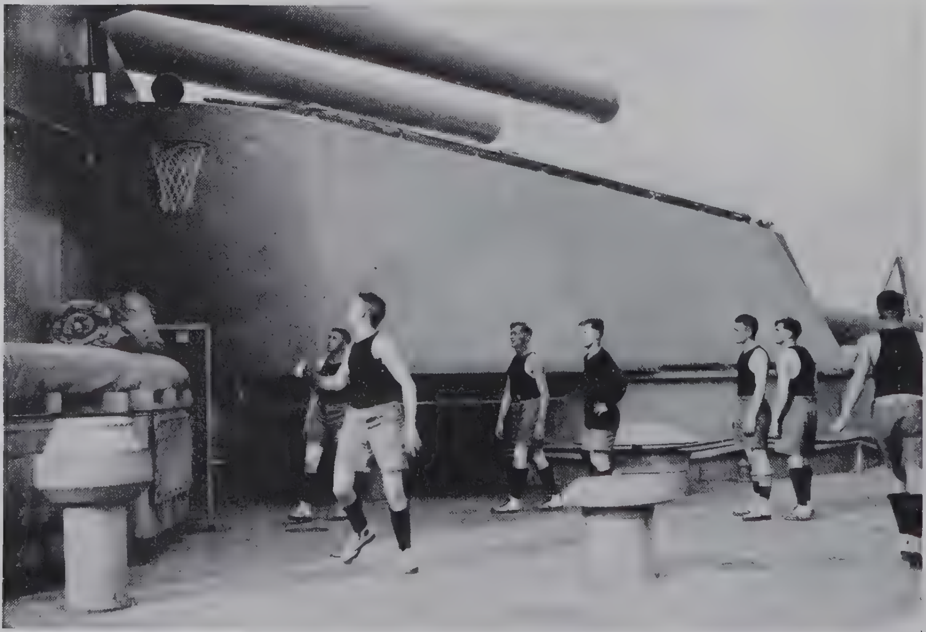
Official Photograph, U. S. Navy

ONE OF THE PRIDES OF THE U. S. NAVY, THE BATTLESHIP "OKLAHOMA," IN GUANTANAMO BAY

Sixty-three officers and 1,565 men constitute the complement of this fighting craft, with its main battery of ten 14-inch guns.

© Burnell Poole

AFTERNOON BAND CONCERT ON THE QUARTERDECK



Official Photograph, U. S. Navy

PLAYING BASKET-BALL ON SHIPBOARD

Official Photograph, U. S. Navy

LEARNING TO AIM TRUE WITH MACHINE-GUNS ON THE GUANTANAMO RIFLE RANGE

With its 264 rifle and 60 pistol targets, this is the finest rifle range used by the United States. It is a part of the 30,000 acres in the vicinity of Guantanamo rented from the Cuban Government as a naval base.

jaunts about the world; he is well fed and well clothed and his physical and moral health are guarded.

Upon his return to civilian life he has attained to a higher and more intelligent standard of citizenship.

ON BOARD THE "BLACK HAWK"

The departure of the Atlantic fleet from the Brooklyn navy yard at dawn on the morning of January 4 was unostentatious and unpicturesque. Battleships and destroyers worked singly down Ambrose Channel to effect fleet formation well out at sea.

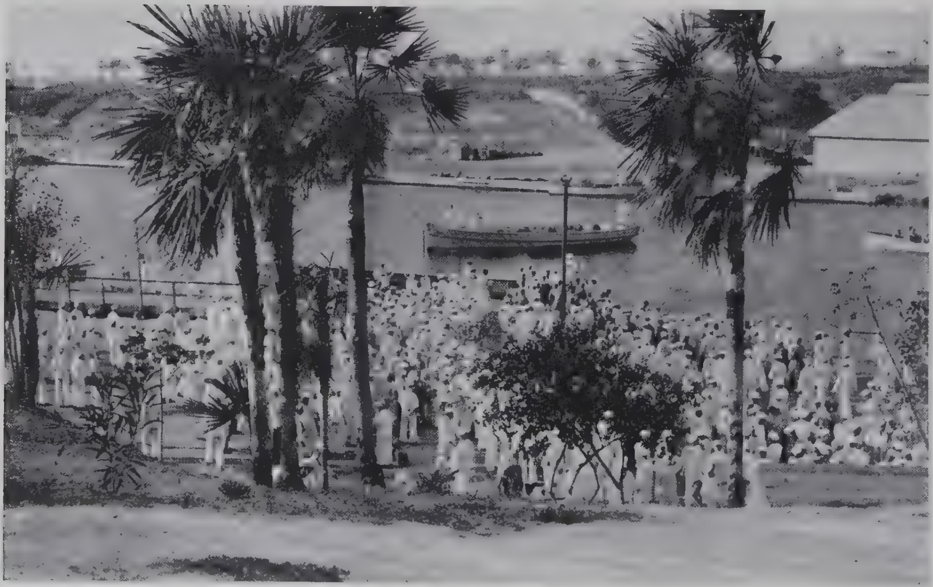
The vessels of the train—the colliers and the supply-ships and the tenders and the cruising foundries and repair shops—smashed and wallowed in their wake.

After a time one capitalizes The Train. It is not dashing and it is a bit grubby, and no one has a kind word for it; nor has The Train a kind word for any one else. But it is what the lines of communication are to the army. Without The Train, the fighting craft had best not put to sea.

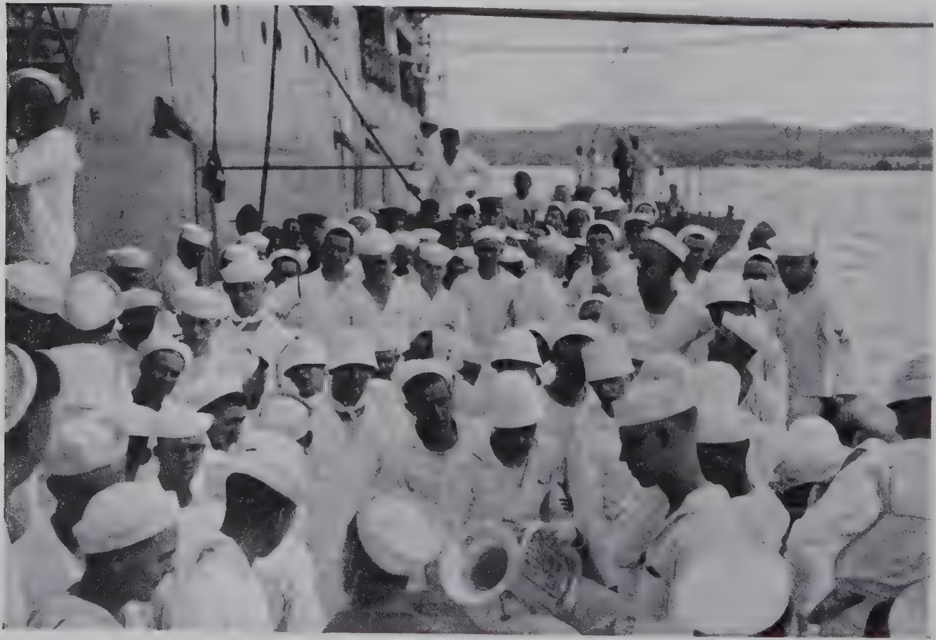
On board the *Black Hawk* one pitied the raw recruits. When the old Grace liner began to hit up her conservative twelve knots an hour, one saw the desire to see the world abate visibly in these young breasts.

The *Black Hawk* was dirty, of course. So was every other ship in the fleet. They had been lying alongside docks, submitting to repairs and taking in stores, for weeks on end. It had not been worth while to clean ship, even if it had been possible in the raw air of a northern winter. But no sooner were the ships in clean blue water than the toilet operations began.

The cargo boom of the *Black Hawk* was astraddle with boys, many of whom had never seen the sea before. The regular rise and fall of her deck sent them perishing with agony. They clung with arms and legs to the boom and put their heads down on it and cursed the sea and those who go down to it in ships. They reminded one of nothing so much as a parcel of young raccoons clinging bottom side up to tree branches.



"GOBS" COMING ASHORE AT THE RECREATION GROUNDS, GUANTANAMO

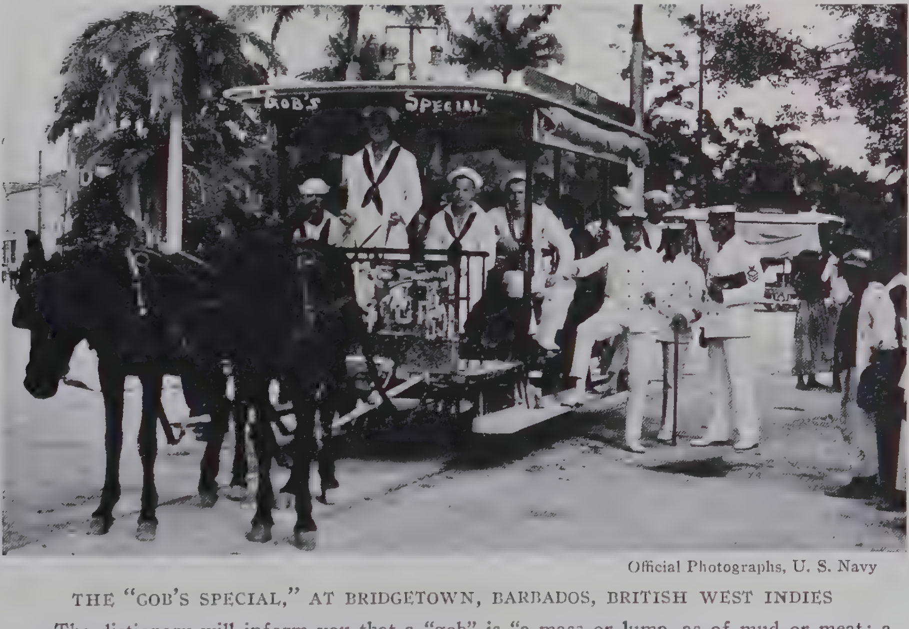


Official Photographs, U. S. Navy

AMERICAN SEAMEN IN THE MAKING ON SHIPBOARD

Soap and the safety razor are in active service with the American bluejacket. Cleanliness is one of the cardinal virtues of the men of the Atlantic and Pacific fleets.

AMERICAN BLUEJACKETS BARTERING WITH NATIVES IN ONE OF THE WEST INDIES



Official Photographs, U. S. Navy

THE "GOB'S SPECIAL," AT BRIDGETOWN, BARBADOS, BRITISH WEST INDIES

The dictionary will inform you that a "gob" is "a mass or lump, as of mud or meat; a large or good-sized mouthful; also a large sum, as of money," but not a word about sailor or seaman. How the word came to be applied to the American bluejacket is a matter of mystery, but the "gob" himself has done it, and, despite all officialdom, "gob" he is to his messmates.

Official Photograph, U. S. Navy

ON THE BEACH AT GUANTANAMO

It is here that the enlisted man begins in earnest to lose the pallor, the narrow shoulders, the white knobs, and bony angles of the civilian and to take on the saddle-colored coat of tan and other attributes of husky health.

But as the worst of the sorrow passed they began to scrub the caked grime, and before the *Black Hawk* was in southern waters they were being swung alongside in cradles to paint her hull. They were already critical of other ships which had not been polished up.

THE MOTHER OF THE DESTROYERS

In the official lists the *Black Hawk* is referred to as the tender for the destroyers. On board she is known as "the mother," and this is the better title.

Almost anything that can happen inside a destroyer can be patched up by the magicians on board. The destroyers run to her with their real and imaginary troubles. They demand potatoes, brass screws, postage stamps, tooth-pulling, and sympathy.

"What's that?" I used to groan each morning in port when the steam winch over my head began to bang and clank.

"A damned destroyer," my room-mate would reply with emphasis. "A double damned destroyer. They spend their lives getting potatoes."

Eventually I learned that it was an article of the *Black Hawk's* creed that no destroyer ever goes to sea with more than a pint of oil in her bunkers; that any one of them would cheerfully start around the world on half a loaf of mouldy bread and a cigarette; that none ever carried spare parts against an engine-room breakdown or ever indented accurately for the parts when the breakdown came; that all destroyer men are idle, irreligious, improvident, and insane.

"They make us haul their condemned parts out to them in our own boats," the Black Hawk would cry, wildly: "Why? Why? Why don't they come gittim themselves? What do they think we are?"

A DESTROYER IS ALWAYS "A BOAT"

I am putting these things down for the moral betterment of the destroyers and to please the Black Hawk. Upon interrogating the boatmen, however—note: a destroyer is always a boat; never anything but a boat; to call a destroyer anything but a boat is evidence either of ignorance or malice; the Black Hawks never spoke of them except as destroyers—I learned they thought of the *Black Hawk* precisely as of a department store and are venomous over her defects in the matter of delivery.

"What do they think their job is, anyhow?" the men of the boats inquired, acidly. "It's their business to bring our spuds."

These relations, the sort of relations that might be expected between a violent and unlovely stepmother and a horde of wild and self-willed children, are modified, however, by the contempt which all persons, even remotely connected with the boats, feel for the "inefficients" who shelter themselves from the wrath of the sea on cumbersome battleships. They say such persons might as well go to sea on dry-docks.

STRENUOUS LIFE ABOARD A BOAT

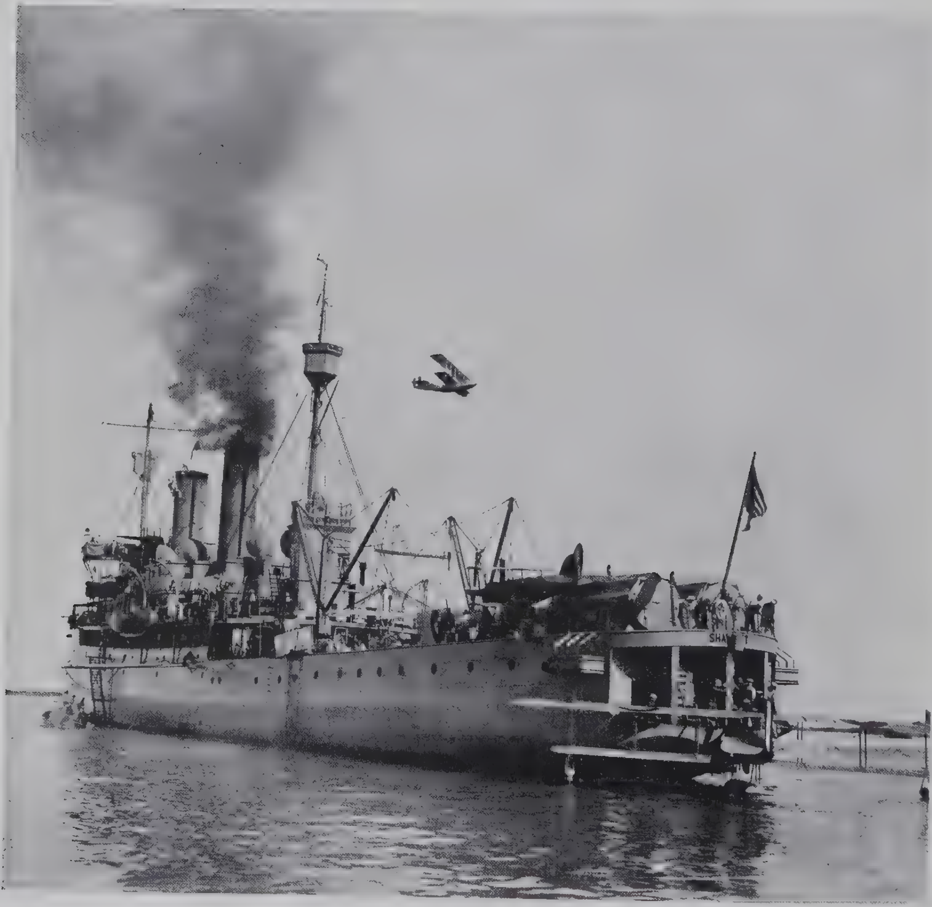
A boatman feels he is just a little better than other men. He lives harder, with less ease, fewer hot meals, more water in his boots, shorter hours of sleep, and more salt in his whiskers than any other seaman except, perhaps, the old-fashioned schoonerman who fishes for cod. He will take more chances, get away with more deviltry, and has less regard for the bones of his hands than any other man in the navy.

By the time the fleet began to buck the January seas off Cape Hatteras it had shaken down to that precision of movement which was rarely disturbed during the remainder of the cruise.

Ahead of us reached the seven battleships, plowing at one another's heels. Then came the vessels of The Train, under the guardianship of the old cruiser *Columbia,* which has a quaint habit of wallowing sidewise as she splashes along her uncertain course. On either broadside were the lines of destroyers.

One suffered for these thoroughbreds of the sea. They are at their best when permitted a speed of twenty knots or so. Thirty-five knots an hour for hours on end are nothing to them. At twelve knots they bob and roll and swing to every slant and ripple of the uneasy water.

And the fleet was pursuing its matter-of-fact twelve knots an hour. That is the economical cruising speed for bat-



Official Photograph, U. S. Navy

THE MOTHER-SHIP OF THE FLYING BOAT FLOTILLA, THE "SHAWMUT"

Once a lowly excursion boat plying Long Island Sound, the exigencies of war opened to this vessel a more serious field of usefulness. When a seaplane is in distress the *Shawmut* rushes to the rescue. Her new dignity and responsibilities, however, have not caused her to change her abominable habit of rolling unpardonably even in the most tranquil sea.

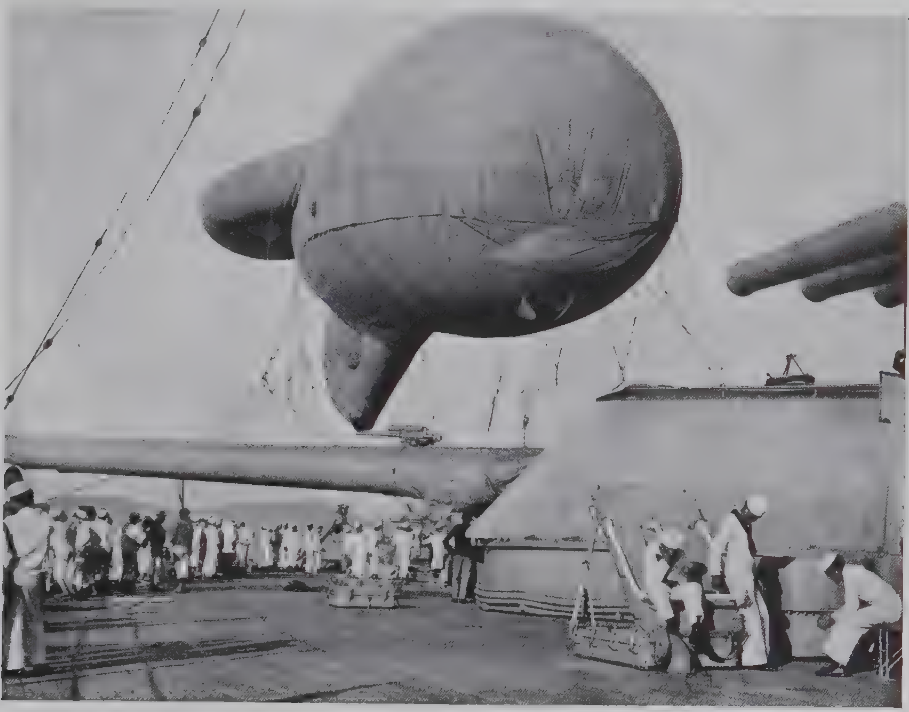
tleships. Instead of cutting knifelike through the tumble of water, the destroyers rolled and jerked and rumbled like drums to the tapping of the impertinent waves.

NO SLEEP ON A BOAT WHEN THERE'S A BIT OF A SEA

At such times, especially if there is a bit of a sea on, no one thinks of sleep on a destroyer. Old hands have an acrobatic habit of wedging their heads and necks in a corner of the berth and so securing a certain amount of rest. The cabin transom is really the best place to sleep, though. One can so pack pillows and coats that there is at least a chance of staying on.

One night on the *Black Hawk* a vicious rain squall wakened me. I had been sleeping with my state-room ports open, and as I drowsily raised myself to cut off an incipient flood I was fascinated by what I saw through the open ports.

The line of destroyers had approached our starboard more nearly than ever before, so that I could see their drunken lights reel over the sea. The waves were piling high, as they have a habit of doing when the Gulf Stream runs coun-



Official Photograph, U. S. Navy

A KITE BALLOON ATTACHED TO THE BATTLESHIP "PENNSYLVANIA," USED FOR SPOTTING PRACTICE

ter to the wind, and the unfortunate boats, pulled down to the agonizing twelve knots an hour, were stumbling and swinging helplessly.

One could imagine how the green water spouted over their bridges and hissed down the engine-room hatches, and what a foul smell of oil and bilge and stale food and cigarettes and pipes and perhaps a few oranges (there are folk who hold that an orange is sometimes a help in seasickness) was battened inside those airless cabins; for when a destroyer gets away from port on anything but a painted ocean all apertures must be stopped against the water. It spurts through every keyhole.

LOYALTY TO HIS CRAFT A BOATMAN'S CHIEF CHARACTERISTIC

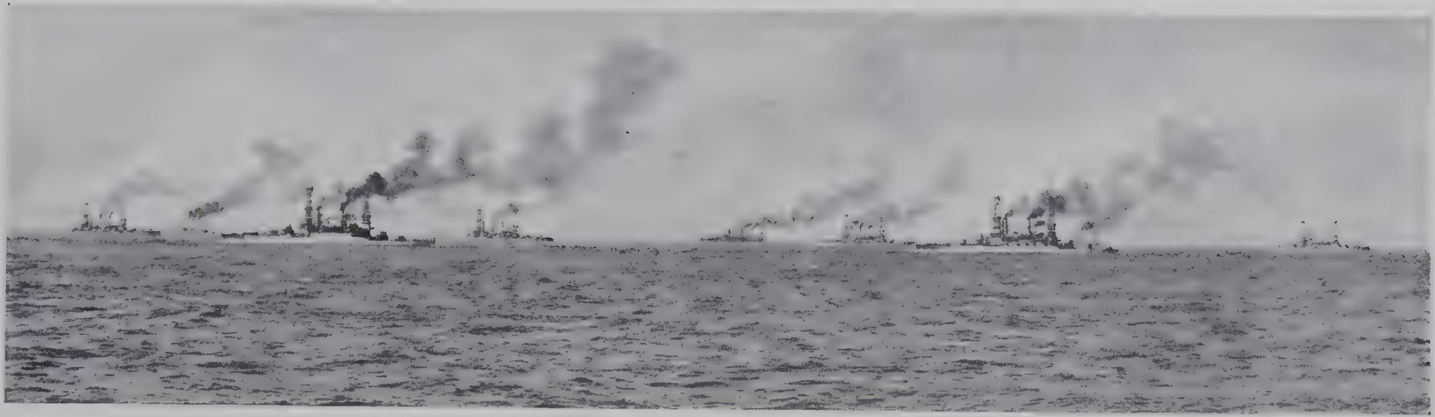
Yet no one belonging to the boats would think of leaving. The men come through a seven-day run looking as though stricken by the wrath of Heaven. On board the larger ships one might hardly know there had been wind or sea, but the men tumbling in a destroyer have been unable to bathe or shave or sleep.

Their food has been sandwiches, which they have only been able to eat by hooking one arm around a stanchion. They are covered with bruises, except where the flesh has been so indurated and woodened that it can bruise no more.

Their eyes are ringed with rime and red as those of an angry parrot. Yet they are so constituted that to tell about the boats they can go without food, sleep, or other necessaries. Their eyes shine and they reach for your arm to shake you into an appreciation of their pets.

"Come with me," said the engineer of the destroyer squadron at the end of a particularly nauseous four-day wallow on the *Black Hawk*. "I'll give you a treat."

Observation had made me somewhat skeptical of the potentialities of enjoy-



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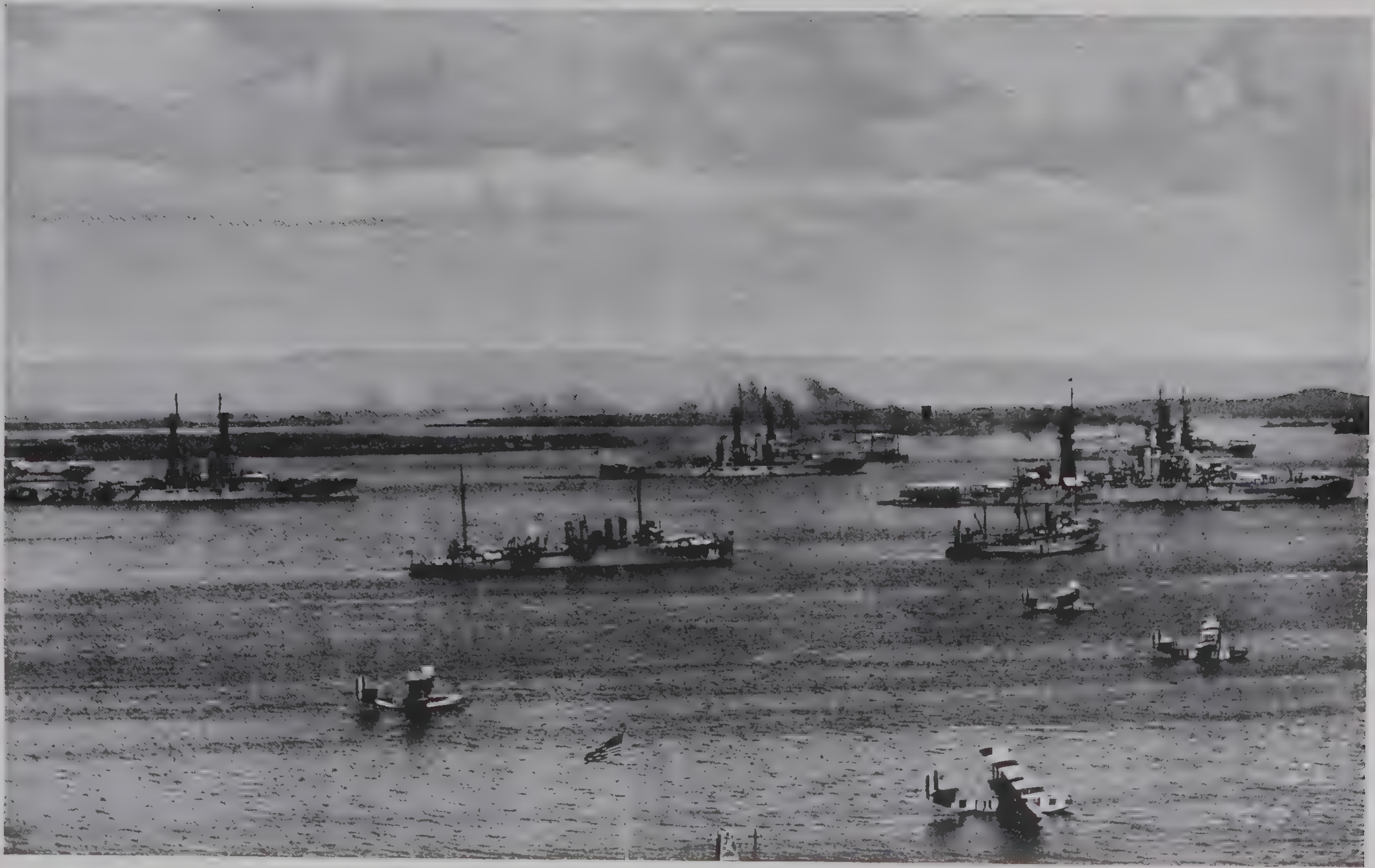
THE ATLANTIC FLEET AT SEA

Official Photograph, U. S. Navy

A FEW UNITS OF THE ATLANTIC FLEET IN GUANTANAMO BAY



Official Photograph, U. S. Navy

NAVAL AVIATION TAKES ITS PLACE WITH THE FLEET IN GUANTANAMO BAY

Battleships, cruisers, destroyers, mine-sweepers, and F. L. 5 flying boats are seen anchored in formation in the commodious bay of the naval base of the United States Navy off the southeast coast of Cuba.

© Publishers' Photo Service

IN THE HARBOR OF KINGSTON, JAMAICA, ONE OF THE FINEST IN THE WORLD

Kingston marked the end of the first leg of the flight of the Atlantic seaplane flotilla in the overseas voyage from Guantanamo to Colon.

© Publishers' Photo Service

DIVING FOR PENNIES IN THE CLEAR WATERS OF KINGSTON HARBOR, JAMAICA

This spirited scene is duplicated in all West Indian harbors where the water is clear and free from the danger of sharks.

ment offered by the treats of boatmen. But the officer was earnest.

"We'll make a speed run on the *Crowninshield,*" said he. It does not seem proper to repeat what he said of the *Crowninshield,* or of certain other boats in the flotilla. No boat could possibly be so nearly perfect. Nor do I believe that boats develop an intelligence of their own, nor that they respond to affection as so many good children might.

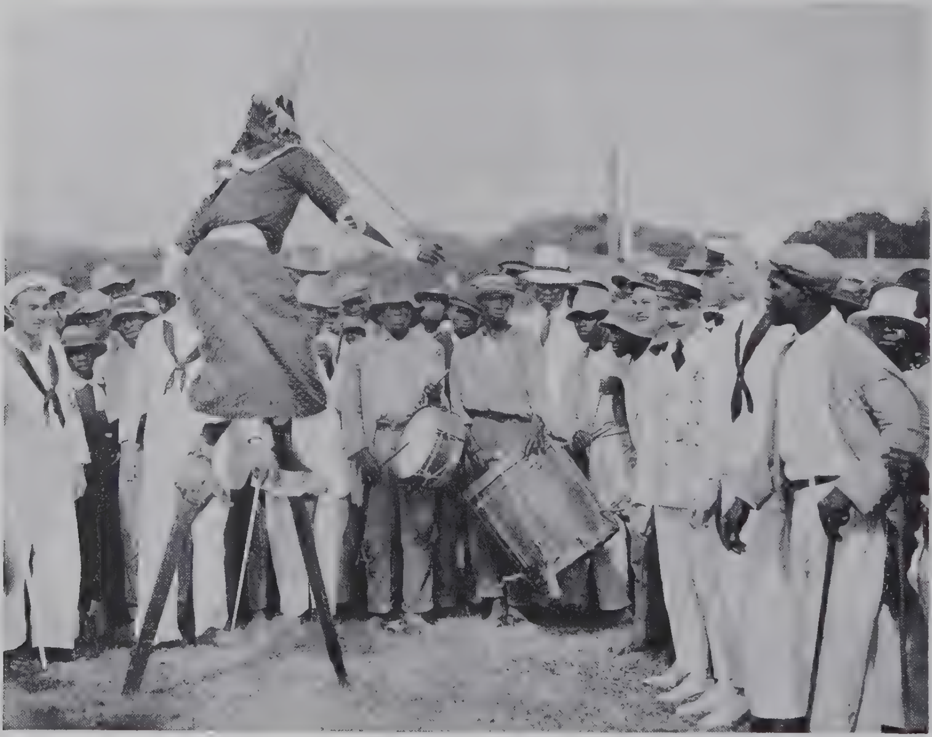
But one can see why the boats are so well loved. There is a freedom on them that is not to be found on the larger vessels, and snappy discipline, with few of the restraints of rank.

The least little fret in international relations may hold a chance to win a name. The boatman feels, I fancy, as the cavalryman does with a thoroughbred horse under him, or like the fighting flyer, as he storms up in a new plane. There must always be the sense of controlled power and independence and always the hope of adventure.

ARRIVAL AT GUANTANAMO

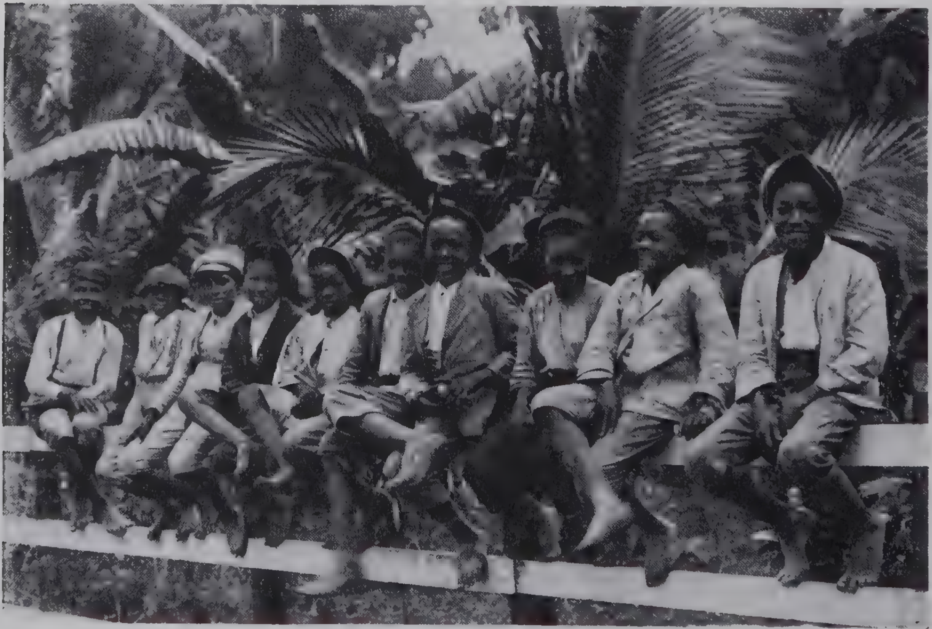
On the morning of January 9 we woke to find ourselves in the sheltered bay of Guantanamo, at the extreme southern tip of the Island of Cuba. Two days before the men had gotten into whites and the blue uniforms had been stowed away for another year.

Now the gobs stripped off blouses and by order appeared in the sleeveless sing-



Official Photograph, U. S. Navy

A STILT DANCE IN THE BRITISH WEST INDIES DELIGHTS THE AMERICANS



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THE COLOR LINE IN JAMAICA

© Publishers' Photo Service

A COUNTRY ROAD IN JAMAICA

© Publishers' Photo Service

A BANYAN TREE IN KINGSTON, JAMAICA

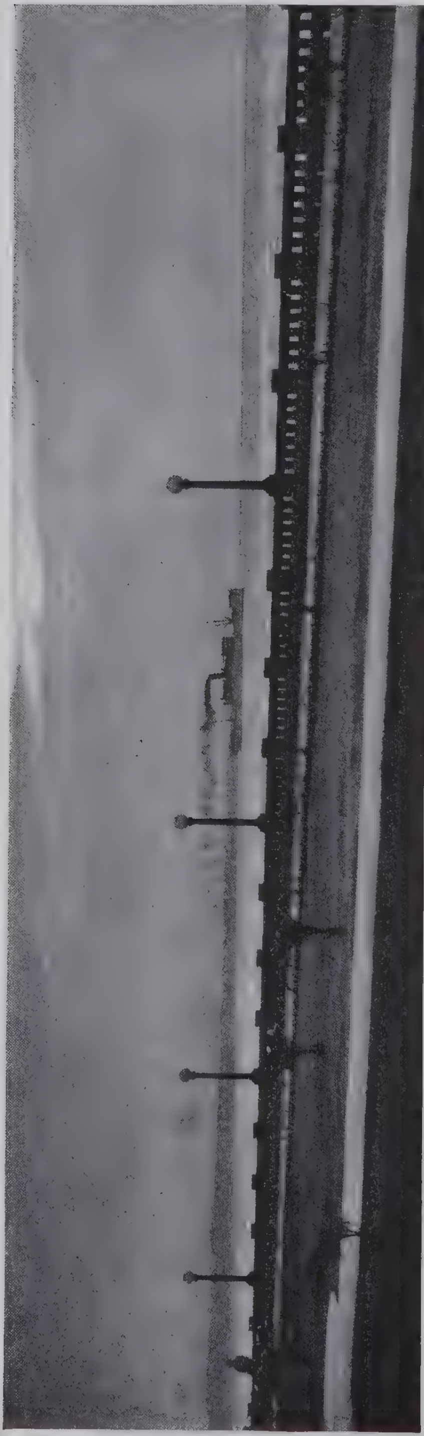
let which is a part of the navy's working costume.

The decks began to offer sights that were at once absurd and pathetic. One thinks of a seaman as a lively person with thick shoulders and an excellent saddle-colored coat of tan, and spring in his heels; but these youngsters who timidly came out of their civilian husks offered studies in white knobs and bony angles.

Their elbows were sharp as boat-hooks and their poor little forearms were puny and pale as the stems of clay pipes, and their feet, slender and weak from years in leather boxes, stepped gingerly upon the rivet-studded deck.

Then the sunburning began. One sunburns by order in the navy, just as one gets vaccinated or shaved. The first day in the sleeveless singlets produced large blotches of bright and inflammatory red upon their virgin shoulders. By the second day some had neatly blistered.

There must be a virtue in sunburn. In another month these anemic, appealing kids had clothed their young skeletons with fine muscles and were as hard as so many sides of frozen beef. Some had begun to sprout little torpedo beards, too. But that is another story.



Photograph by Earle Harrison

THE SEA WALL AT TWILIGHT: COLON, PANAMA

WHAT GUANTANAMO MEANS TO THE ATLANTIC FLEET

How many know that the United States has a plant of extraordinary value and efficiency at the Bay of Guantanamo? Or what it means to the Atlantic fleet each year? I did not. I'll confess it.

I had a vague idea that the fleet each winter visited a cactus-bordered beach on which the men walked for health's sake, and that from time to time it went outside for battle practice.

I knew there were a couple of tiny towns near by—Caimanera and Bucoron—where rum, roulette, and ruin might be had at a price. But the background to the picture was always bare white sand and cruelly hard sunlight and scrubby bushes, with a restless surf beating at an inhospitable strand.

That impression was utterly wrong.

Guantanamo Bay lies at the southern

tip of the Island of Cuba—a tip that is for the most part useless for farming purposes. It consists of a body of water almost completely landlocked, covering about 10,000 acres.

Not far away is the harbor of Santiago, where Admiral Cervera's fleet was crushed during the Spanish War. Some of the rusty hulks still lie in the water's edge.

Around the bay is a circle of low, brown hills, covered by a mesquite scrub, into which long, narrow valleys thrust like the outstretched fingers of a hand. The water's edge is bordered by the vivid green of the mangrove, except that occasional warm and sandy beaches invite swimmers.

Now and then the sharp fin of a shark is seen. Pelicans drift overhead with their air of aldermanic dignity. Fish-hawks are forever circling against a sky of almost incandescent blue.

THE FINEST RIFLE RANGE USED BY THE UNITED STATES

Here the United States has rented from Cuba, "for so long a time as it desires," an area of 30,000 acres, in which the bay is included and inclosed. A rental of $2,000 annually is paid.

At the station were 1,100 men at the time of the fleet's visit. There is a sufficient number of marines to preserve order and act as first aid in the event of any near-by trouble, and the remainder are workmen.

The striking features are the rifle ranges, which have a capacity of 264 rifle targets and 60 pistol targets up to 1,000 yards range, and can be expanded indefinitely.

This is the largest and finest range used by the United States. In a month ranges could be placed up these narrow valleys, against the background of the soft brown hills, in which ten thousand men could be taught sharpshooting each day.

Once there was a golf course, but it has been made over into a landing ground for the ship-planes that were forever maneuvering overhead. They are to be carried on especially built vessels, and a maximum of skill will be required of the flyers to get away from and return to these moving platforms without accident. Hence the continual acrobatics in the air.

LIGHTNING PLAYS HAVOC WITH BALLOONS AT GUANTANAMO

There is a balloon school, too, in which observers are taught to ascend in captive balloons—the "sausages" of the war—but Guantanamo's neighborhood seems to be dangerous to these craft. Last year three were brought down by lightning.

There are hospitals and club-houses and canteens.

On the flat land ten baseball diamonds have been laid out for the use of the fleet, and ground has been cleared for others. There are tennis grounds and handball courts and all the features that are needed in a plant which is designed not only as a training ground for 15,000 to 20,000 seamen annually, but to provide for their healthful recreation.

The wild animals of the hills have learned that this is sanctuary, so that one sees deer now and then and kicks flocks of wild guineas from beneath one's feet. The commandant has built good roads and pleasant walks and charming gardens, but the principal attraction—as soon as the gobs hear of it—is the pig-pen.

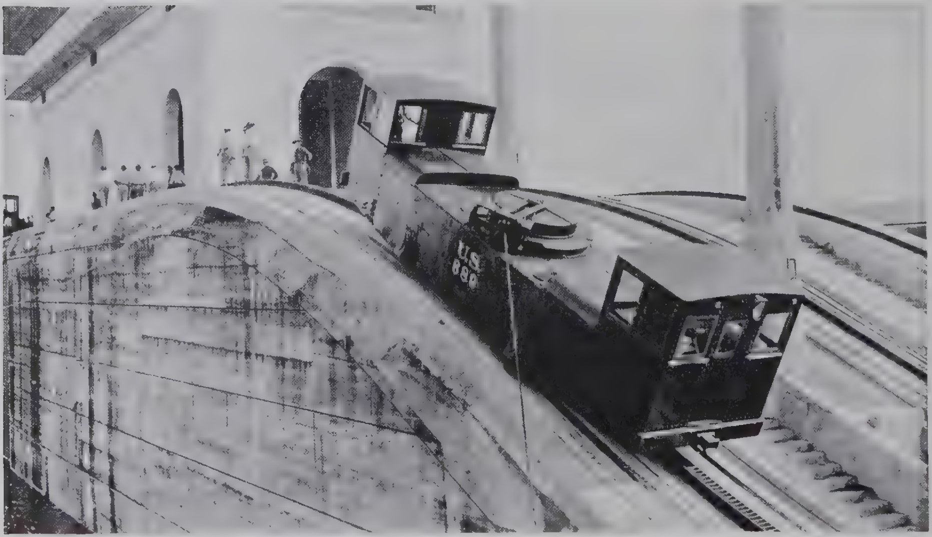
Officially, this pig-pen is accounted for by the best of utilitarian reasons. Figures prove that the animals earn hundreds of dollars for the government annually. But I shall always believe that the originator of the pig-farm was a Middle Westerner with fond recollections of the old farm.

There is something homy and comfortable under this Cuban sun about the grunt of a Duroc Red lady whose small children are gathering sustenance while she sleeps in the shade. Sailors are always standing about regarding this spectacle wistfully.

The corporal of marines who is the official custodian of the pigs has the air of proud importance which might befit a beefeater guarding the Crown jewels in the Tower of London.

CAIMANERA AND ITS ONE THOUSAND ASSORTED SMELLS

And there is, of course, always Caimanera. One thousand assorted smells as-



Photograph by H. G. Cornthwaite

A TOWING ELECTRIC "MULE" CLIMBING FROM ONE LOCK LEVEL TO THE NEXT HIGHER: PANAMA CANAL

Ships are not allowed to use their own power, but are towed through the locks by electric locomotives to prevent accident.

sail the nostrils when one climbs on its rickety boat wharf. Small dogs sleep in the sun or scratch themselves with an irritated vigor rarely manifested by other dwellers of the town.

Little naked gourd-shaped babies permeate the principal thoroughfares and make excellent mudpies between showers. At intervals the Caimanera waterworks is dragged through the plaza on a cart pulled by two goats. Life is leisurely, contemplative, and eminently social.

"Sis's Place" and "The Two Sisters" and "The American Bar" woo thirsty callers by a display of backbars stacked with bottles. There are no fronts to the saloons, so that one pauses on the pavement, so to speak, to wet an arid whistle.

There was a time when the bottles in the backbar were racked with the cork ends outward, but on one occasion an Indian-club swinger practiced his art upon the passers-by. Since then the bottles have been more difficult to reach.

The buildings along one side of the principal street are half supported by piles.

On their verandas, overhanging the water, one sees dark-skinned women dressed in flowing white, languidly fanning themselves as the ship's barge putputs in. All the way up the Guantanamo River the atmosphere has suggested Joseph Conrad's African backgrounds. The dark currents, the violent green of the contorted mangroves that curtain the banks, the "Red Mill" at which a sugar schooner bakes lazily in the sun and near which a solitary saloon is thrust invitingly forward over the water—all have a remote and exotic air.

Near the saloon an American sailor with the black-and-green badge of the shore patrol on his arm roasts profanely. There are various areas in Caimanera which are emphatically out of bounds.

ONE HOUR ASHORE

At Caimanera the officers on liberty—gobs never get ashore here—hurry to Pablo's or the American Club. Every moment is of value. The boats rarely reach the dock before 5 o'clock and they start fleetward at six sharp. Pablo and Toney rain perspiration from their dark brows as they shake 'em up. At either hand stands a crockery pitcher filled with

Photograph by H. G. Cornthwaite

THE GATUN SPILLWAY WITH TWO GATES OPEN, DISCHARGING WATER AT THE RATE OF 20,000 CUBIC FEET PER SECOND: PANAMA CANAL

The spillway regulates the height of the water in Gatun Lake and prevents it overflowing during heavy tropical floods. At times six or more gates are opened at once to take care of big floods. The illustration shows two of the gates open.

the seductive Daiquiri. A boy grinds at the ice-shaving machine in the rear. Pablo and Toney barely have time to make change.

So it goes down the dingy, dusty, sometimes flagrantly muddy street, with its weird multitude of vicious odors. Cubans look at the Americans with a certain reservation. It is not the Cuban temperament to hurry so over a handful of drinks. Nor does the Cuban need to hurry. Big negroes, with the strong features of the Arab, look one squarely in the eye.

Here and there one sees a conical thatch, which lends an air of distinction to the sordid streets of one-story shanties roofed with tin.

On Sundays the cockfight lasts all day long. The owners parade the streets with their sleepy birds under their arms and the laborers throng in from near-by plantations in their newest clothes.

SETTING SAIL FOR COLON

Brightwork was shining and paint was glistening when the fleet set sail for the second leg of its long cruise to Peru.

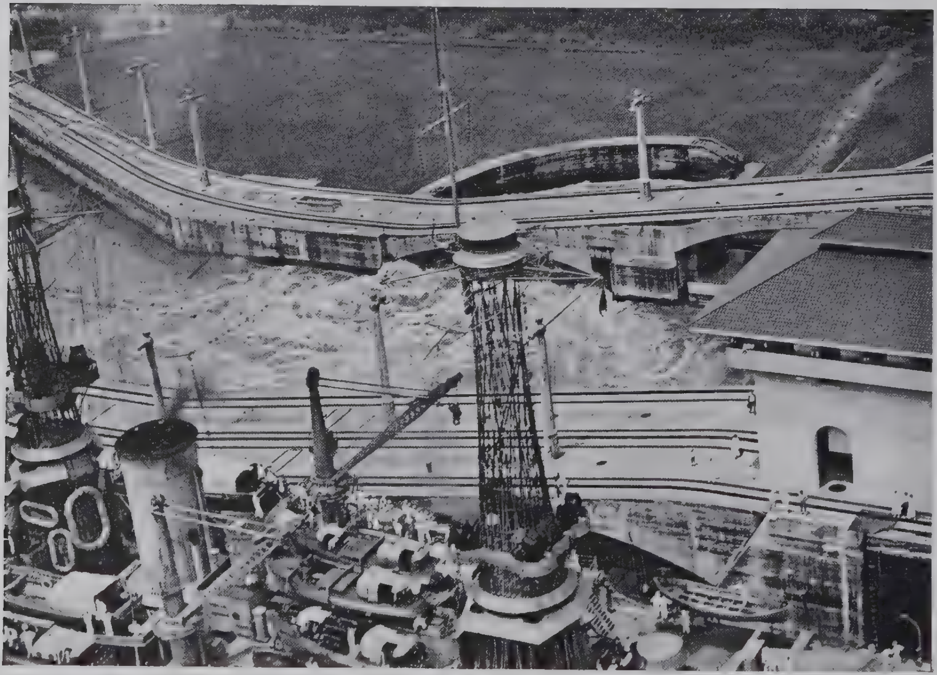
It was a different fleet entirely. The rust of the winter had been rubbed off ships and men alike. The next stop was to be at Colon, at the Atlantic end of the Panama Canal, where the Strangers' Club opens its hospitable doors.

Every writer of Central American fiction has come here to gain color for his narrative. Some have not gone beyond it. Why, indeed, should they, when any day the men drinking at the tables can offer the story of adventures that are incredible and true? One hears of the college man who has turned savage and of the lake that is paved with golden vessels sunk in it to save them from the hands of the Conquistadores——

But I temporarily abandoned the fleet at Guantanamo in favor of the seaplanes. The Atlantic flotilla of F. L. 5's had hopped down the coast from Philadelphia and was on its way to the Panama Canal.

I made my temporary headquarters on board the *Shawmut*, the mother-ship of the airboats.

The *Shawmut* has not lost the habit of rolling she acquired before the war, when



Official Photograph, U. S. Navy Air Service

THE "NEW MEXICO" LEAVING LOCKS IN THE PANAMA CANAL

Close-up photographs of this kind constitute a part of the argument of the aviation advocates, who believe that the airplane is making obsolete the first-line battleships (see "America in the Air," by Brigadier General William Mitchell, in THE GEOGRAPHIC for March, 1921).

she used to carry excursionists down Long Island Sound. It is my conviction that she will roll her rail under if a gob misplaces a tin knife. Maybe I am wrong, but I know what I know.

A DEFENSE OF "GOB"

At any rate, this seems a good place to defend the word "gob." Every naval officer resents its use. Not one will concede there is such a thing or a word as gob. It will be admitted that it does not sound sweet and pretty, any more than "chow" or "hike" or any of the other one-syllabled words that came into use through war. But as the sailors call themselves gobs (and never by any chance refer to themselves as tars or bluejackets or seamen) and unquestionably discovered or invented this name, I submit that they are a sufficient authority.

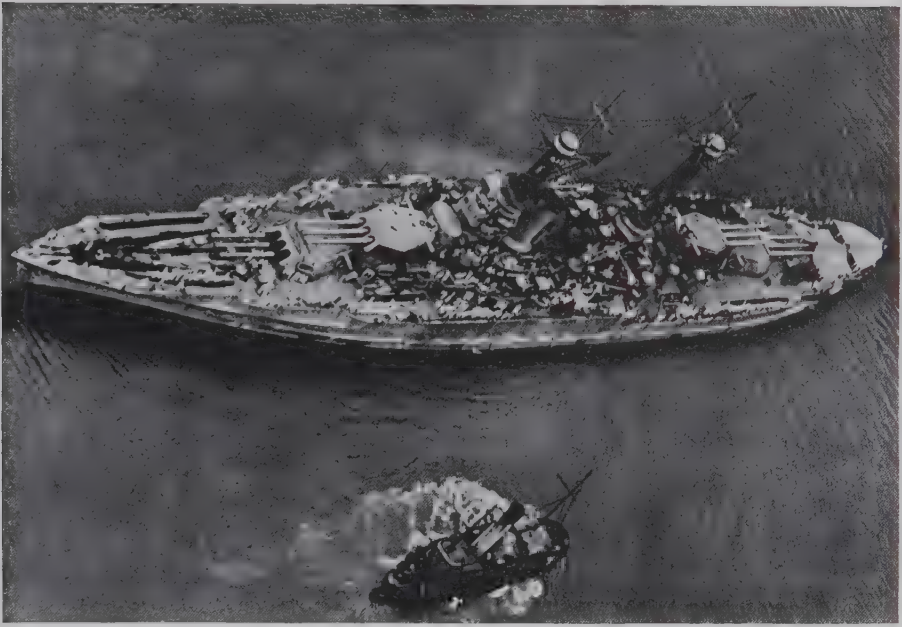
Gold lace may fume, but between decks they will continue to be gobs.

Flying to Jamaica on board one of the seaplanes did not seem a stunt at all. There is something reassuring in the bulk and weight of these giants, just as there is in the apparent indestructibility of a battleship. They are not as large as the N. C. type, it is true, but a boat with a top wing span of 107 feet and which when loaded weighs seven tons is not as terrifying as the butterflies in which one flies over land.

LIKE FLYING ON THE VERANDA OF A COUNTRY CLUB

From my seat in the rear cockpit, with a 330-horse-power Liberty motor rasping at either ear, I looked down the twin lines of massive wing struts and felt as though I were out for a fly in the veranda of a country club.

It was only as we sat upon the *Shawmut's* emotional deck in the calm waters of Kingston harbor that I learned the day had been a bad one for flying.



Official Photograph, U. S. Navy Air Service

AN AËRIAL VIEW OF THE "NEW MEXICO"

This photograph conveys an excellent idea of the arrangement of the four turrets, from each of which three fourteen-inch guns are operated.

Or, rather, the day had been a bad one for alighting. From our 1,000 feet in the air the tiny whitecaps that sparkled below had but added to the beauty of the scene, to my amateur eye. Now I discovered that the airboats, for all their seeming strength, are but fragile things when they measure their forces against those of the sea.

Ten seaplanes began this cruise and only seven reached Colon. Yet every possible care had been taken, and not once did they take the air except when flying conditions were excellent.

"Our trouble," as the commander of the flotilla said, "is that if we make the boats strong enough to be thoroughly seaworthy the craft is too heavy to be forced into the air."

A FLYING BOAT LOST

On the first day of the flight from Kingston to Colon No. 4311 was lost. The air was perfect. There was not a hint of fog, the flying man's bugaboo, and there was a following wind. The squadron's commander, speaking for his adventurers, had begged permission to fly straight through to Colon, a distance of 630 miles. But the flotilla commander had learned conservatism in dealing with the air force. His experience is that something invariably happens if a flight is projected on the assumption that nothing will.

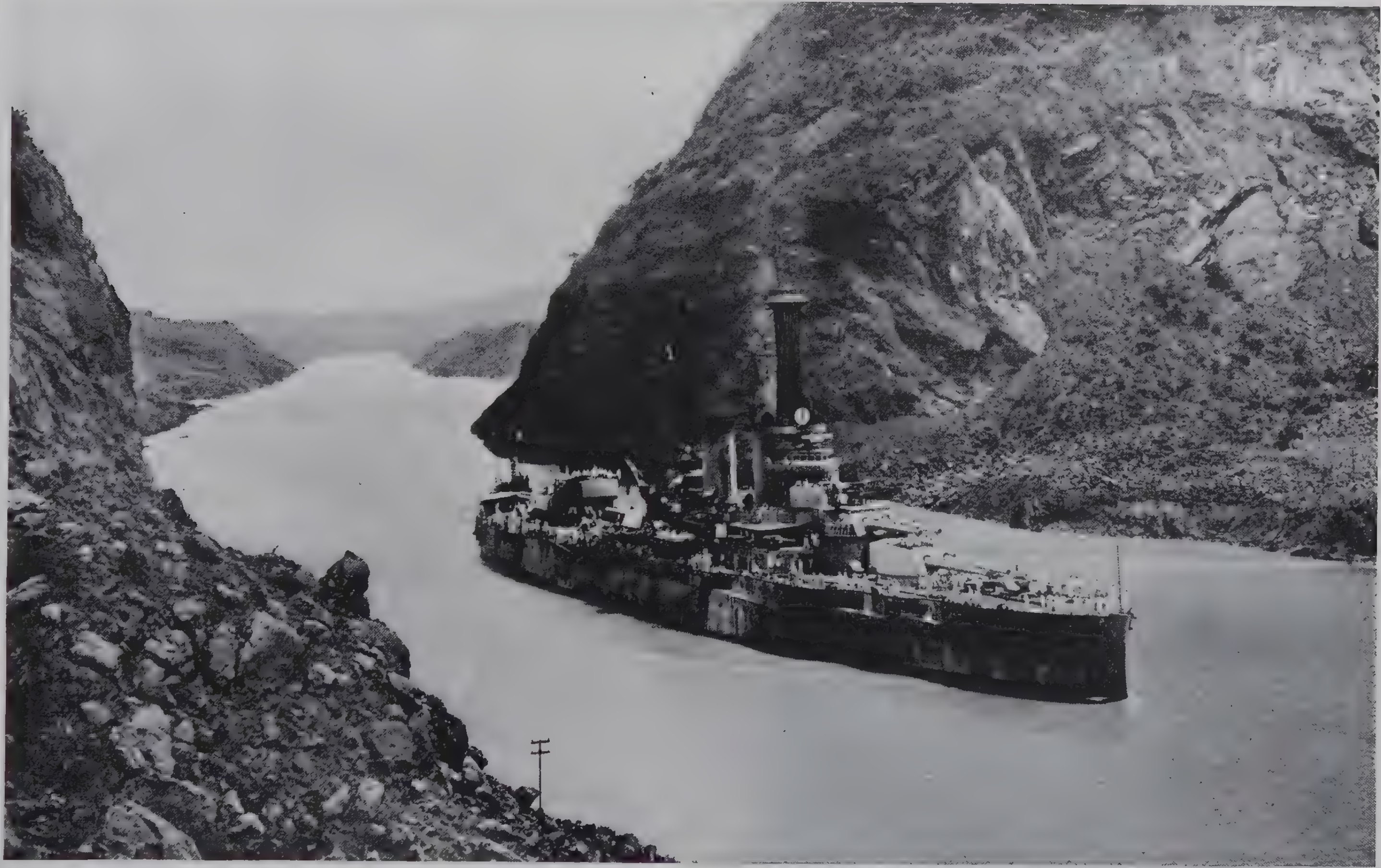
"Old Providence Island is about half way," he said. "We will stop there first. Maybe we will not all get in."

Old Providence Island is 380 miles from Kingston, and next day, as we were rolling blithely along in the *Shawmut,* spilling the dishes over the fiddles whenever a flying-fish kicked up a sea alongside, the wireless began to talk:

"Forty-three eleven is forced down on Sarrana Reef."

We began to hammer through the Caribbean seas.

One began to realize the anxiety that preys continually on every one connected with the flying forces. No one knew what had happened to 4311, but what



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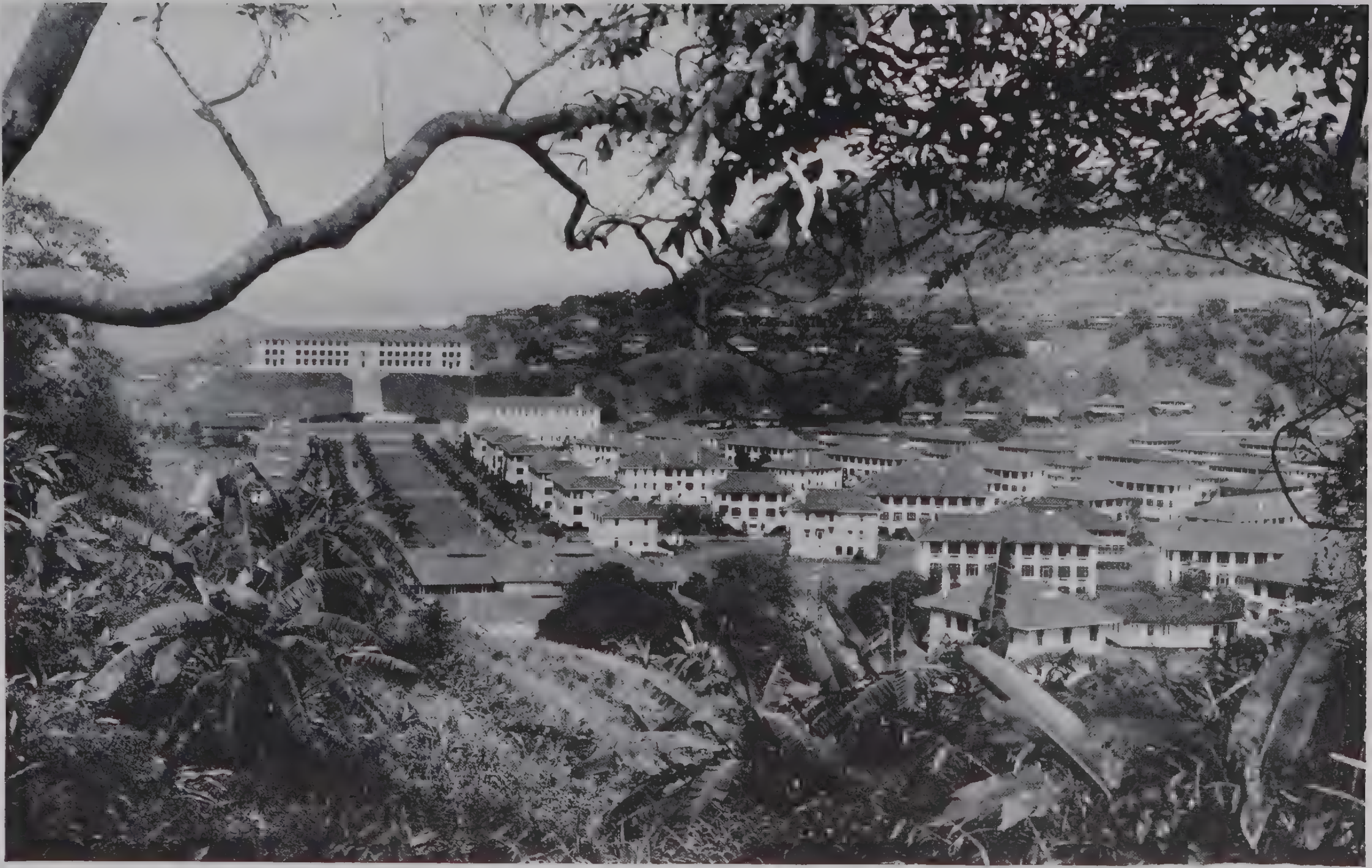
THE "TEXAS" PASSING THROUGH THE GAILLARD CUT, PANAMA CANAL

The *Texas* became a unit of the American Navy the year of the outbreak of the World War. It has a main battery of ten 14-inch guns and a secondary battery of sixteen 5-inch guns, with four 21-inch torpedo tubes.



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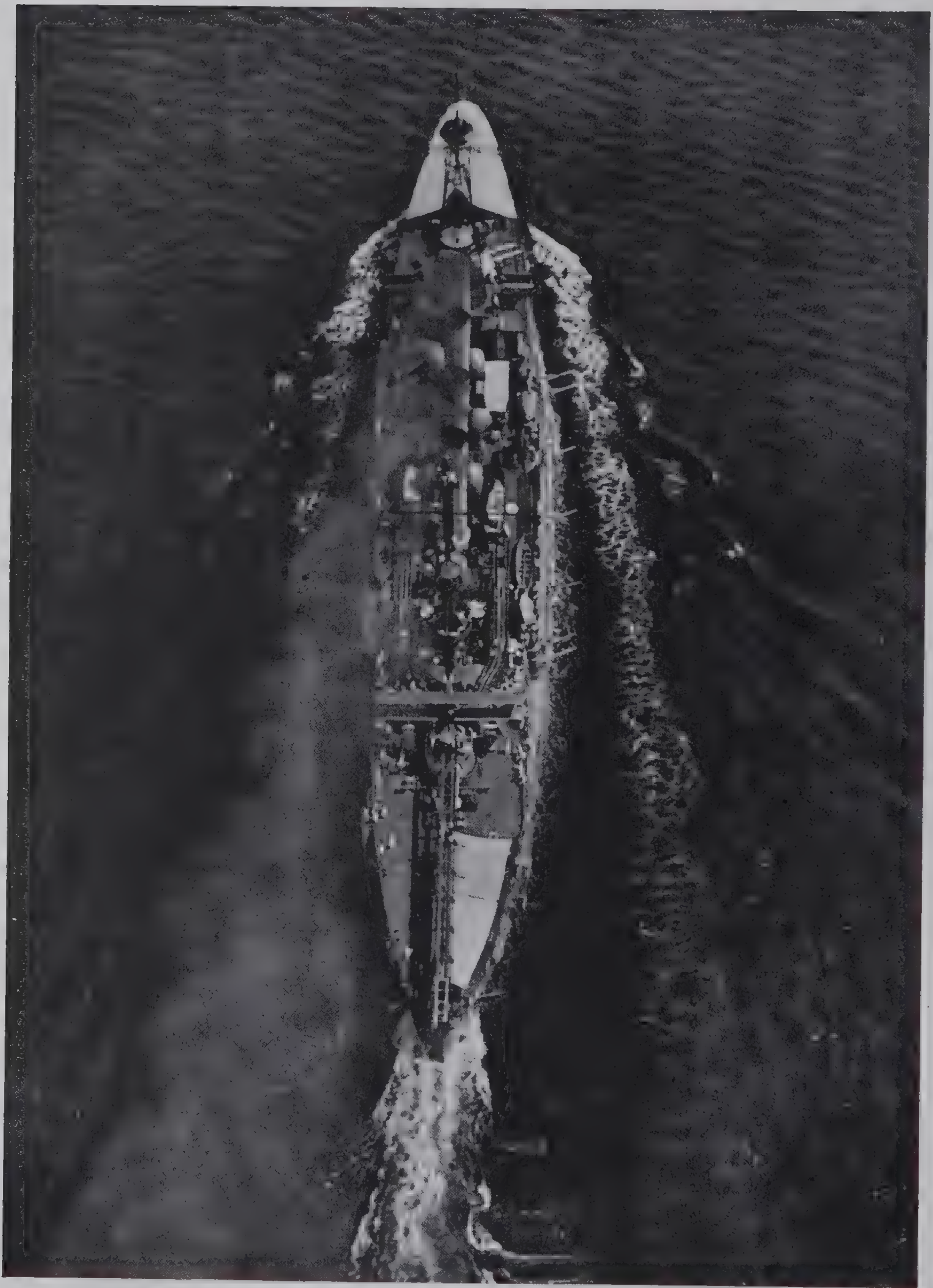
BALBOA, THE SEAT OF UNITED STATES GOVERNMENT IN THE PANAMA CANAL ZONE

Balboa and its adjacent community, Ancon, make an ideal residential city with wide, well-lighted streets, and spacious houses with wide, screened verandas. The United States Government operates all the commissaries and restaurants, and owns all the houses, which are occupied by the canal operatives and their families. The large building on the hill is the administration headquarters.



Official Photograph, U. S. Navy Air Service

THE AMERICAN ARMORED CRUISER "HUNTINGTON" AS SEEN FROM A KITE BALLOON

In addition to its target range, its naval and aviation base, Guantanamo has a balloon school, but the neighborhood has proved perilous for the "sausages." Three were brought down by lightning at this station last year.

Official Photograph, U. S. Navy

OUT OF ITS ELEMENT: THE FLOATING WRECK OF A KITE BALLOON

every one did know was that no seaplane can last long in even a trifling sea.

Just a few days before one had been forced down in a choppy little tangle of water—the sort of sea a dory would make nothing of at all—and her body had snapped square in two.

That sort of an accident had never happened before. Her mate alighted on the water in an attempt at rescue and her body snapped. The crews of the two planes had only been saved by a combination of miracle and calm American courage.

The wireless caught a little now and then, first from 4311's radio and later from the destroyer *Hatfield,* which was standing by. The seaplane had found shelter under Sarrana Banks and might, possibly, be saved.

Her mate, No. 3681, was flying overhead, as a fishhawk might circle over a wounded mate, but she was ordered on to Old Providence. There was nothing that she could have done, in any case. If 4311 had gone to pieces and the *Hatfield* had not been at hand, 3681 must have flown overhead and watched the

© Burnell Poole

THREE UNITS OF AMERICA'S FIRST LINE OF DEFENSE

The United States Navy has sixteen first-line battleships now in commission; the seventeenth (*Maryland*) and eighteenth (*California*) are completed, but not yet in commission. There are nine other first-class ships whose keels have been laid and are now building.

five men drown in the Sarrana's waters. An attempt to alight would have sacrificed her own crew.

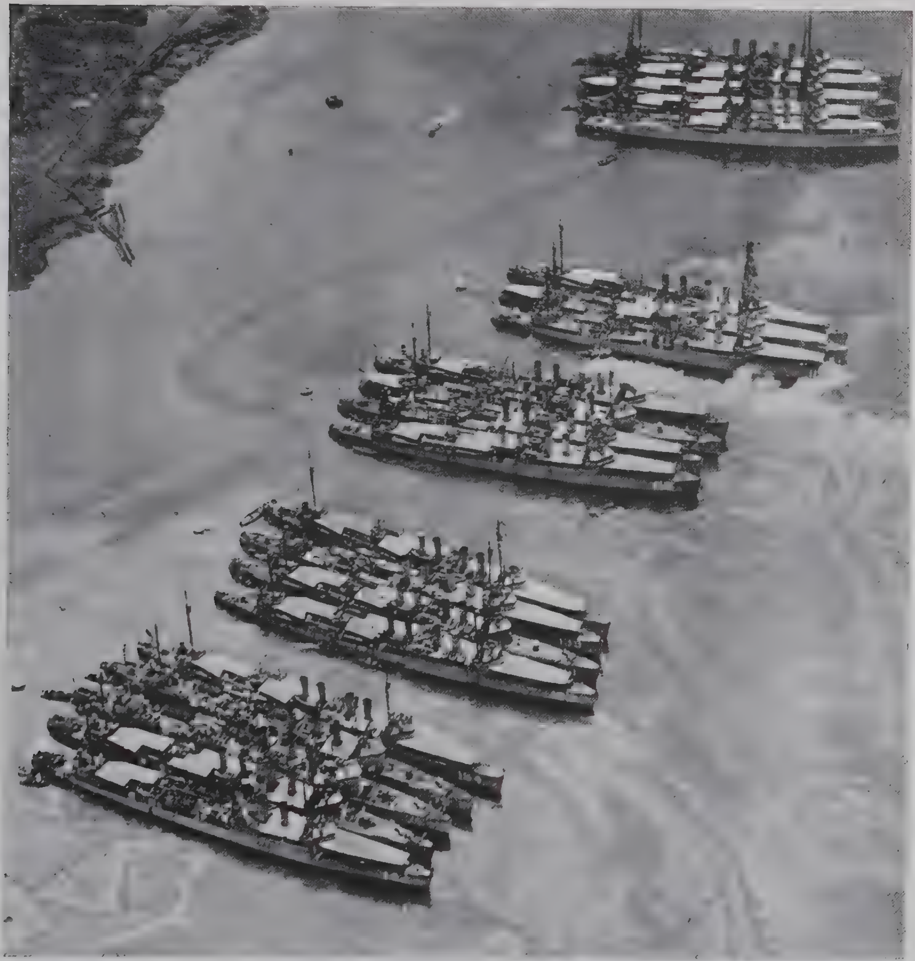
TRYING TO SAVE A CRIPPLED SEAPLANE

A day of full steam ahead brought the *Shawmut* to the Sarrana Banks.

This is a hopelessly desolate bit of land. There is no fresh water on it, no food, no trees, no grass, no men. At one end an automatic, self-acting lighthouse blinks day and night on its three months' charge of carbide. All around a nasty sea kicks on hidden rocks.

The Sarrana reef was last charted by a British ship ninety years ago, and the depths have so changed that the inner circle of the reef is a trap for ships. But it had saved 4311. Without its shelter the plane must have gone to pieces and its five men drowned before help arrived.

Successive bulletins had told the *Shawmut* that the port overhang of the 4311 was smashed, the aileron had gone, and that the tower shaft was out of commission. There was nothing to do but send for Captain "Bill" and his own variety of first aid, which he carries



Official Photograph, U. S. Navy Air Service

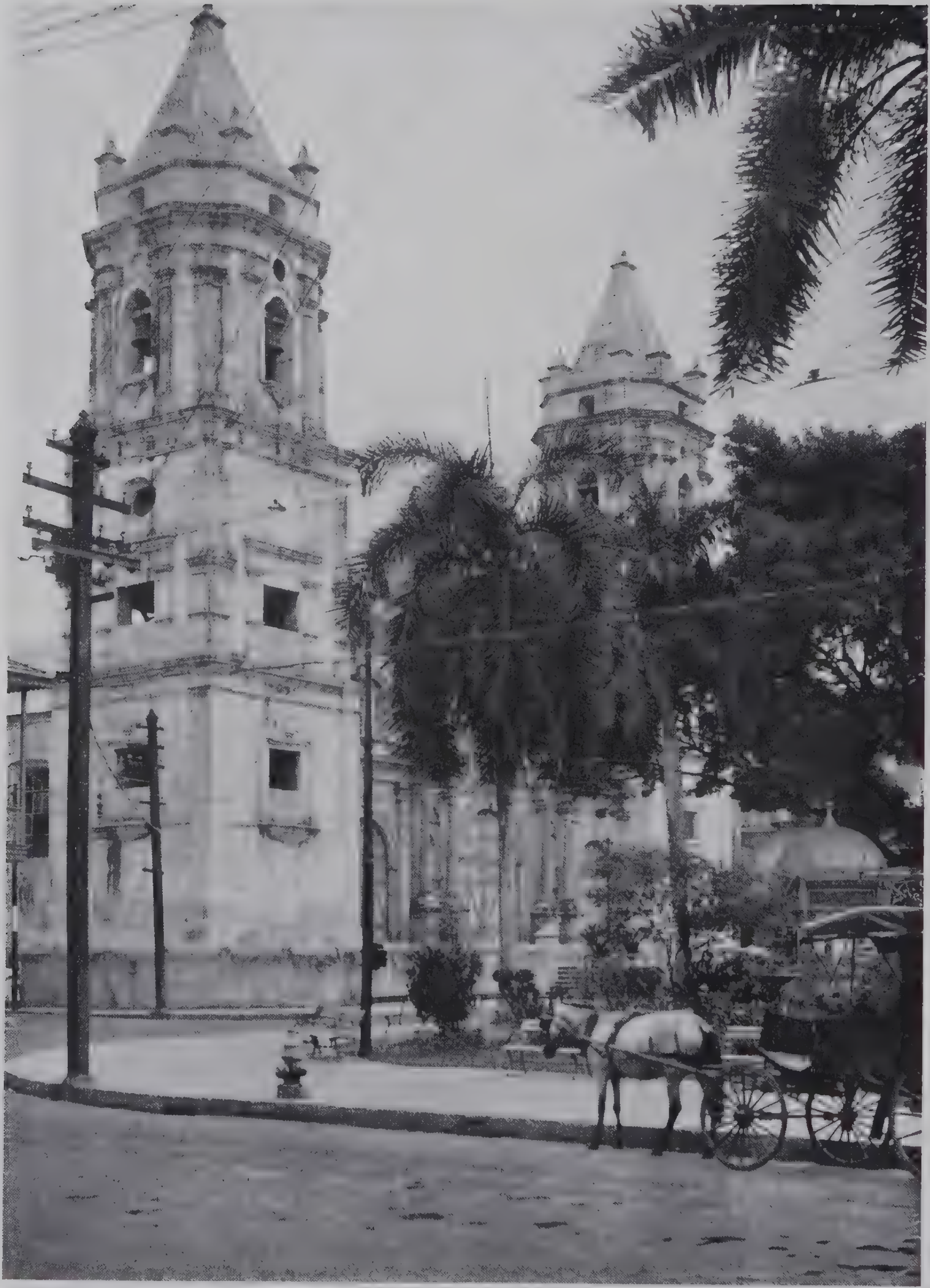
TWENTY-ONE AMERICAN DESTROYERS ANCHORED OFF BALBOA, PANAMA CANAL ZONE

The United States Navy's destroyer fleet consists of 281 vessels of the first line and 21 of the second line. The average destroyer of the first line is from 310 to 314 feet long, has a speed of 35 knots, is equipped with four 21-inch torpedo tubes, and has a complement of eight officers, eight petty officers, and 106 men.

on the mine-layer *Sandpiper*. Captain "Bill's" specialty is in doing things that have never been done before, which is of value in the airboat service, because things are happening there that have never happened before.

The *Sandpiper* is one of the neatest and sturdiest craft imaginable. She has a wide fantail aft and a neat round body which tapers into an impertinently sharp nose. Captain "Bill" would cheerfully undertake to drive her through the Gobi Desert if called on.

On the decks of the *Sandpiper* a miniature dry-dock is carried. That was gotten overboard and the hurt plane loaded in the well. But it did not reach port. There was no bad weather—no particularly bad weather—but the waves snapped the wings off and finally destroyed the plane. It was a mere incident of airboat flying. The flyers hope



Photograph by Earle Harrison

A CORNER OF THE CATHEDRAL PLAZA, PANAMA CITY, THE HEART OF THE REPUBLIC

It was in this plaza that the people proclaimed their independence from Spain more than a hundred years ago, and from Colombia in 1903. The cathedral dates from 1760.

that some day they will be given a motor that will never stop, and so they will be absolved from the necessity of carrying a burdensome boat.

OLD PROVIDENCE, WHERE IT COSTS NOTHING TO LIVE

One wonders what the inhabitants of Old Providence Island thought when the seven remaining airboats of the flotilla swooped down to wait for news of the foundered plane. No airboat had ever been seen before in that part of the world.

The crews perched in their tiny cockpits, unable to go ashore because of fleet quarantine regulations, and looked longingly at the land.

Old Providence is four miles long and eleven hundred feet high and everywhere is a vivid green. Sometimes a little yawl brings mails and canned goods from Colon. This does not often happen.

"How much does it cost to live here?" the flyers asked of the port official, who was paddled in a dugout to give them pratique. Over his head he held a yellow umbrella. In one hand he fitfully agitated a small yellow flag.

"Why, nothing," said he, puzzled.

All day long the flyers sat in the shifting shade of the upper wings, as their planes bobbed on the placid water, and smoked many angry cigarettes.

But Old Providence did its best to entertain them. The brown belles and beaux paddled out to chat. Small, naked boys did perfectly unbelievable feats of swimming and diving for pennies. Large family parties were rowed out in sturdy boats. The most delicious oranges and bananas the Americans had ever tasted were offered at infinitesimal prices. But of the romantic island of Old Providence the flyers thought only as of a place in which they had been marooned.

"Gee," they reported. "We were glad to get away."

THE MARVEL OF THE CANAL TAKEN AS A MATTER OF COURSE

It is doubtful if Young America, as represented 'tween decks, fully appreciated the marvel of the Panama Canal as the warships passed through its great locks. They were immensely interested, of course. One could see the fighting tops of the great ships white with sailors. Their decks seemed to have been whitewashed, so thickly had the men gathered to gaze overside at the electric mules and the lock mechanisms (see page 592).

But most of them had been fed for the better part of their lives with stories and pictures of the canal. They took great achievements as a matter of course, as all Americans do. Nothing seems impossible or even improbable to them.

The boys commented wisely on the various mechanical gadgets used in the canal operation, but the thing that really aroused their enthusiasm was the zone's flylessness.

This was within the range of their every-day knowledge. Every boy born on a farm or reared in a village knows of the plague of flies and mosquitoes the summer brings. All knew that the tropics are the happy home of every bug that flies or creeps. Yet they saw the Canal Zone—this green ribbon which unites the two oceans in the very heart of the tropics—as clean and shaven and bugless as though it had been painted on a backdrop.

For one question I heard about the building or operation of the canal I heard a dozen about the process of getting rid of winged pests.

"We're a pretty smart people at that," was one boy's conclusion. "We can get rid of them whenever we really want to."

THE TWO FLEETS JOIN

It was at Panama that the Pacific fleet joined that from Atlantic waters, and the combined fleets steamed for Peru and Chile in company.

The greater part of each day was occupied in what were called maneuvers, but were really tactical exercises. The purpose was to accustom the deck officers of the various ships to work in concert.

The spectacle of more than sixty ships of war moving in harmony was a superb one, but it was not until it was announced that the fleets were to have night battle practice that the real thrill came. That night I was leaning over the port rail in company with an officer.

The night was one of soft blackness. Not a star was reflected in the placid sur-

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ABLUTIONS AL FRESCO: A STREET SCENE IN PANAMA CITY

face of the Pacific. There were no lights visible, although one knew that somewhere fourteen battleships and thirty-six destroyers were playing the war game together. There was not a sound except the rustle of the water thrust back by our blunt prow.

Suddenly my eyes became aware that a sinister shadow kept silent company with us. At first it seemed only a blob of deeper black. At last I realized that a destroyer was so near by that I might have tossed a biscuit aboard. For the first time I fully realized the deadliness of the boats.

"Why do we not fire on her?" I asked my companion.

"We were sunk ten minutes ago," said he. "We're out of action."

At Panama the heat had been blistering, as the ships lay at anchor, under the protection of the cluster of round islands that will eventually be fortified for the protection of the canal mouth. The protection is a perfect one. No ship of war can ever hope to get between the meshes of that screen of islands, although the canal remains as undefended from aircraft as is every other secret place in the world.

But the moment the start was made for waters farther south a cool breeze searched the most remote corners of the ships. Even the old-timers found it difficult to adjust themselves geographically.

We were bound "up south" and leaving the warm neighborhood of the isthmus for the delicious coolness of the Equator!

In the distance we later saw the green shores of Colombia and Ecuador, visible on the horizon as faint lines of cloud.

The farther south the fleet traveled, the more delightful became the temperature.

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A BANANA-LADEN DUGOUT CANOE ON GATUN LAKE, PANAMA

The faintest of breezes ruffled the calm water, so that one might sit all day upon the quarterdeck without the pages of one's book so much as fluttering.

At night the stars were barely over the mastheads and vividly bright. A luminous lane led straight over the waters to Venus, which gleamed with such an emphasis of light that the first words of the newcomers to the deck each night were usually addressed to the Queen of Beauty.

LIGHT OVERCOATS AT THE EQUATOR

The sailors spent hours in identifying the constellations, although in northern latitudes they had not paid a moment's tribute to the heavens.

When the neighborhood of the Equator was reached, light coats were needed at the evening movie shows. The sailors who clung to singlets clotted in the neighborhood of the engine-room hatches, from which a warm and pleasant current was always flowing.

For this reversal of the expected the Humboldt Current was responsible. This may not be quite as remarkable a phenomenon as the Gulf Stream is on the other side of the continental wall, but its effects upon South American conditions are hardly less marked. It has actually shoved the South Temperate Zone north; so that while the vicinity of the Equator should be the warmest place in the world, it actually is not.

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THE FRUIT MARKET ON THE BEACH AT PANAMA CITY

This deep, cold current sweeps the depths of the sea and brings up algæ that are foreign to these latitudes. The fish follow the algæ, and the birds follow the fish. Penguins which belong in the Antarctic Circle are living happily off the coast of Peru.

Much of the wealth of Peru is derived from the guano beds produced by the guano-birds, which are estimated to have an actual value to the state of $15 per pair. The giant condor, which lives at a chilly altitude of 15,000 feet, is able to swoop down to sea-level to prey on guano-birds, thanks to the temperate influence of the Humboldt Current.

But to the old-timers—the flat-feet—these are the Horse Latitudes and the Doldrums. They had many stories to tell of ships becalmed here for weeks, in spite of the whistling of the bos'ns and the throwing overboard of silver money and the affectionate pampering of such Finns as might be on board.

CROSSING THE LINE

Sometimes, though not often, an albatross was sighted. Nor were sharks as numerous as the greenhorns had supposed.

After all, the chief interest at this time was in the arrival of Neptune and his courtly party. The men who had crossed the Line before talked of little else for weeks. In every dark corner Neptune and his courtiers swore gruffly at landlubbers who tried to overhear their deliberations.

Costumes were being made and tried on behind locked doors. Some had been brought from New York and some were a part of the permanent equipment of the ship. Most of the dresses of ceremony had been bought at Panama, however, where the Chinese shopkeepers do a regular business in purveying starry crowns for Neptune himself, and the latest and most shameless lingerie for Amphitrite.

One or two of the younger and prettier seamen were seized upon for pages to be decked out in long silk stockings and permanent blushes. No one was more unhappy aboard than these pages in the days just preceding that of the ceremony. An exception may, perhaps,

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THE MUNICIPAL MARKET IN PANAMA CITY

The "Ditty Box Guide Book," which was given to every member of the fleet before landing at Panama, gives this version of the origin of the nickname "spiggoty," applied by Americans to the natives of Panama: "When the Americans first arrived on the Isthmus the cab-drivers would shout, 'Me speak it, the English.' This soon changed to 'spickety,' and then to 'spiggoty.' Thenceforth the Panamanians were 'spiggoties.'"

be taken to that statement. No doubt the most unhappy man was the greenhorn who permitted himself to be frightened by the heartless old tars, who told of Neptune's severity.

"How is your heart?" they would rumble to the young man from the prairie town, who had never even heard of Neptune before he went to sea. Horny hands would feel the frightened flutterings of the victim's breast.

"You may get through," the amateur diagnosticians would say. "I dunno. It's pretty weak. Hey, Tom. C'me here and feel this guy's heart!"

THE GREATEST LEVEE NEPTUNE EVER HELD

This was certainly the greatest levee that Neptune ever held since he began his practice of climbing over the bows of ships as they cross the Equator. Not less than 25,000 men appeared before his courts on the sixty-odd ships. The total was probably greater, for it was estimated that not more than 5 per cent of the 31,000 men on the combined fleets had ever crossed the Line before.

On the night of January 23 the Herald came aboard. Up to this moment the promised ceremony had seemed distant and humorous. Now it took on an air of dignity. One felt that this fine old tradition of the sea would be upheld in a proper spirit. The ships had been jogging placidly along, when from our foretop came a frightened hail:

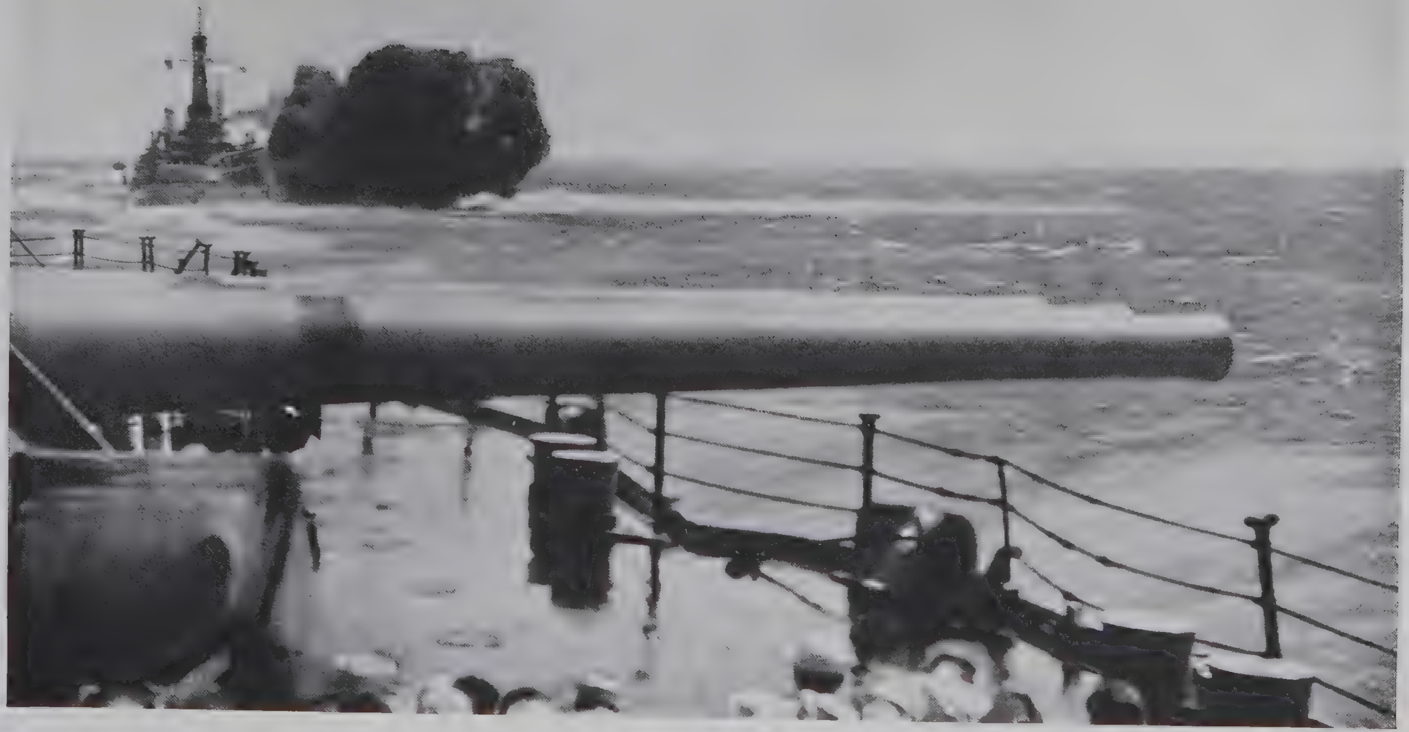
"Light ho! Light on the starboard bo-ow."

At first the men who rushed to the rail thought the light was from one of the life-rings equipped with lamps, for use when men go overboard on dark nights. But it was seen to be a flare set adrift in a tub from whatever ship was

Official Photograph, U. S. Navy

"THE FARTHER SOUTH THE FLEET TRAVELED THE MORE DELIGHTFUL BECAME THE TEMPERATURE"

In practice cruises it is not only the constant "march and countermarch" of the ships that is watched, but the amount of smoke which issues from the funnels of each ship. Good engineering means no plumes of smokes.



Official Photograph, U. S. Navy

THE "NEVADA" FIRING HER FOURTEEN-INCH GUNS

In the extreme foreground note the heads of the men of a sister ship watching the gigantic plume of black smoke emitted from the muzzles of the great guns.

5TH DIVISION
UTAH, FLA., DEL., N.D.
DIVISION PRACTICE
MARCH 25 1911

Official Photograph, U. S. Navy

SPLASHES FROM GUNFIRE: TARGET PRACTICE AT SEA

To the layman these splashes seem uncomfortably close to the observation ship, from which the photograph was taken. Note the muzzles of the big guns at the top of the picture.

at the head of the long line. As it fell astern, a hoarse voice was heard from the bridge and a masquerader in spunyarn wig and whiskers cried that at 8 o'clock of the following morning Neptune would come aboard.

The formula is unvarying. In all the years and on all the thousands of ships the wording has hardly changed.

SHIPS SURRENDERED TO NEPTUNE'S NAVIGATOR

So, at 8 o'clock of the morning of January 24 every ship in the fleet checked her way, while a ponderous figure, topped with a gilded crown, climbed aboard from the chains and marched down the deck at the head of his crew.

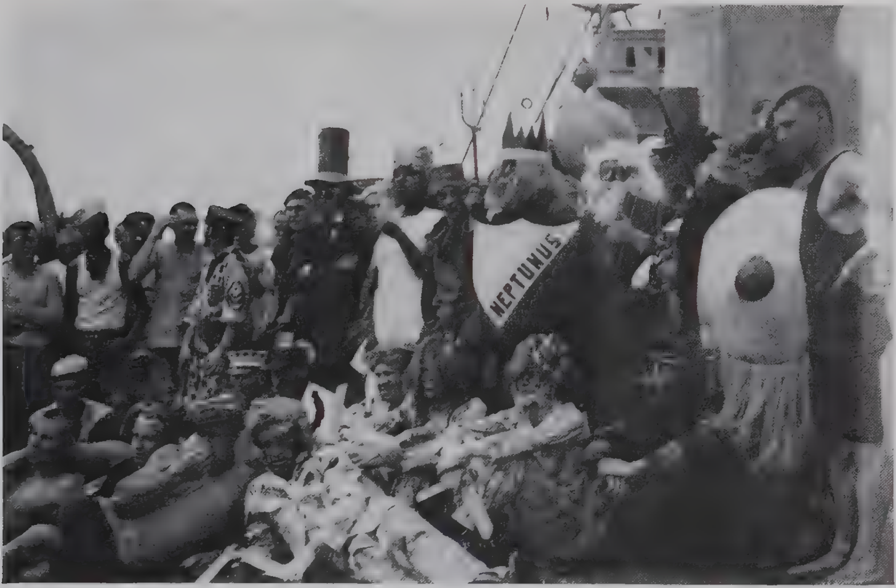
The men grinned at Neptune and Amphitrite and the court jester and the rest, of course. That is American fashion.

For all that, there was an element of solemnity as well as of fun in the ceremonial. It seemed to link these youngsters with Drake and Morgan and the others who first sailed these seas.

The captains turned over their ships to Neptune's navigator, who took the bridge. The crew moved to the forward decks, where the tanks had been built. The court criers began to read the names of those who had never crossed the Line before.

Ordinarily this performance is somewhat drawn out. When there are but two or three to admit to Neptune's realm the monarch's ingenuity is taxed to give them a fitting initiation. But Neptune had too much work before him on this occasion to give his humorous inclinations free rein. On some of the battleships 1,400 men were to be ducked, and few vessels had fewer than 200.

Only the first two or three victims heard the speeches put in Neptune's mouth by tradition. After that quantity production was the rule. The courtiers and dentists and doctors rolled up their sleeves and fell upon the neophytes.



Photograph by Herbert Corey

FATHER NEPTUNE AND HIS COURT ON BOARD THE "BLACK HAWK"

Probably never before in the history of the sea has Neptune held so great a levee as when the Atlantic and Pacific fleets of the United States Navy "crossed the Line" on the trip to Peru and Chile. Not less than 25,000 men appeared before his courts on the sixty-odd ships.

"What's your name?" Neptune would growl.

As the unfortunate opened his mouth to reply a nauseous pill of grease was slipped between his teeth. The barbers slashed at him with a huge brush covered with a lather of flour paste and shaved him with a wooden razor. He was tripped in the barber's chair and spilled backward into the tank six feet below.

The bears seized him, thrust him under water half a dozen times, swung him to the deck again, and turned, perspiring, to catch the next apprentice as he whirled head downward through the air toward the floury waters of the tank.

The extraordinary feature of the visit of Neptune was yet to be seen. In the effort to give a proper scenic investiture to their rôles, those of the flat-feet who had been chosen for the parts of courtiers had permitted their beards to grow.

Later on it seemed they could not give them up. They tortured their whiskers into new and strange shapes. They wore them as torpedoes and paint brushes and little dabs of hair high up on the cheekbones and as galways and burnsides. People turned upon the street in Panama and Lima to gaze after them, and the enraptured gobs thought of new ways in which to train their hirsute adornments. It may be they are still bearded, but I doubt if their mates have resisted temptation.

THE FLEETS SEPARATE

South of Callao, Peru, the two fleets separated for a time. The Pacific fleet went on to Chile, while the Atlantic fleet turned back to Peru. Both were to pay visits of ceremony.

The vessels comprising the Atlantic fleet coasted along this extraordinarily arid coast whose brown dryness is in such contrast to the tropical verdure farther north.

Both Chile and Peru are bordered by a belt of desert country, lying between the Andes and the sea. Here the Andes have three separate crests, which act as compressors in squeezing the last drop of

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THE HARBOR OF CALLAO, PERU, WHERE THE ATLANTIC FLEET PAID ITS CALL OF COURTESY

Chief seaport of Peru, Callao is also the gateway to the capital, Lima, situated seven miles inland. It is a town of 30,000 inhabitants, mainly Peruvian, but with a goodly sprinkling of Indians, Japanese, and Chinese. The American fleet was fortunate in visiting the city sufficiently early in the year to avoid "the painter," an unpleasant odor which fills the harbor in March and April. The phenomenon is attributed by some to the remains of innumerable small dead fish brought in by the tide.

moisture out of the breezes which sweep up the Amazon Valley from the Atlantic. Once in seven years, or thereabouts, a little rain falls in the dry belt.

For years Peru accepted this condition without demur. There were advantages in the absolute dryness of the air.

Not far from Lima is a buried city, four thousand years old, in which the houses were built of unburned clay. Their fronts were molded in crude designs by the Indian architects, and the tracery has remained unharmed by the passage of years. Bodies of animals found on the plains have been mummified without decay.

One would think that some one would have reasoned that cities cannot exist without water, and that there are abundant evidences to prove that at one time this coast was extremely populous. But no one did.

PUTTING ANCIENT IRRIGATION DITCHES TO WORK AGAIN

Then a foreigner made a discovery. Wandering through the arid region, he saw what he thought might be the remains of ancient irrigation projects. A little investigation convinced him that he had under his eyes a complete irrigation system, built by the Incas or their prede-

Official Photograph, U. S. Navy

MEN OF THE AMERICAN FLEET IN THE STREETS OF PERU'S CAPITAL

It was a cordial welcome which Lima extended to the representatives of the northern republic; even the motion-picture theaters were specializing in American films; but the great show staged for the benefit of the visitors was the bull-fight, held in the largest bull-ring in the world.

cessors, which had but to be cleared of the accumulated sand to function again as perfectly as in the Incan days.

He paused long enough to buy a large tract from the Peruvian Government, and then cleared out the old ditches and turned into them the water that had been flowing down from the hither slopes of the Andes to lose themselves in the desert sands. Today he has one of the greatest sugar estates in the world, and every main-line ditch is just as it was first surveyed and excavated thousands of years ago by a people we are apt to think of as savage.

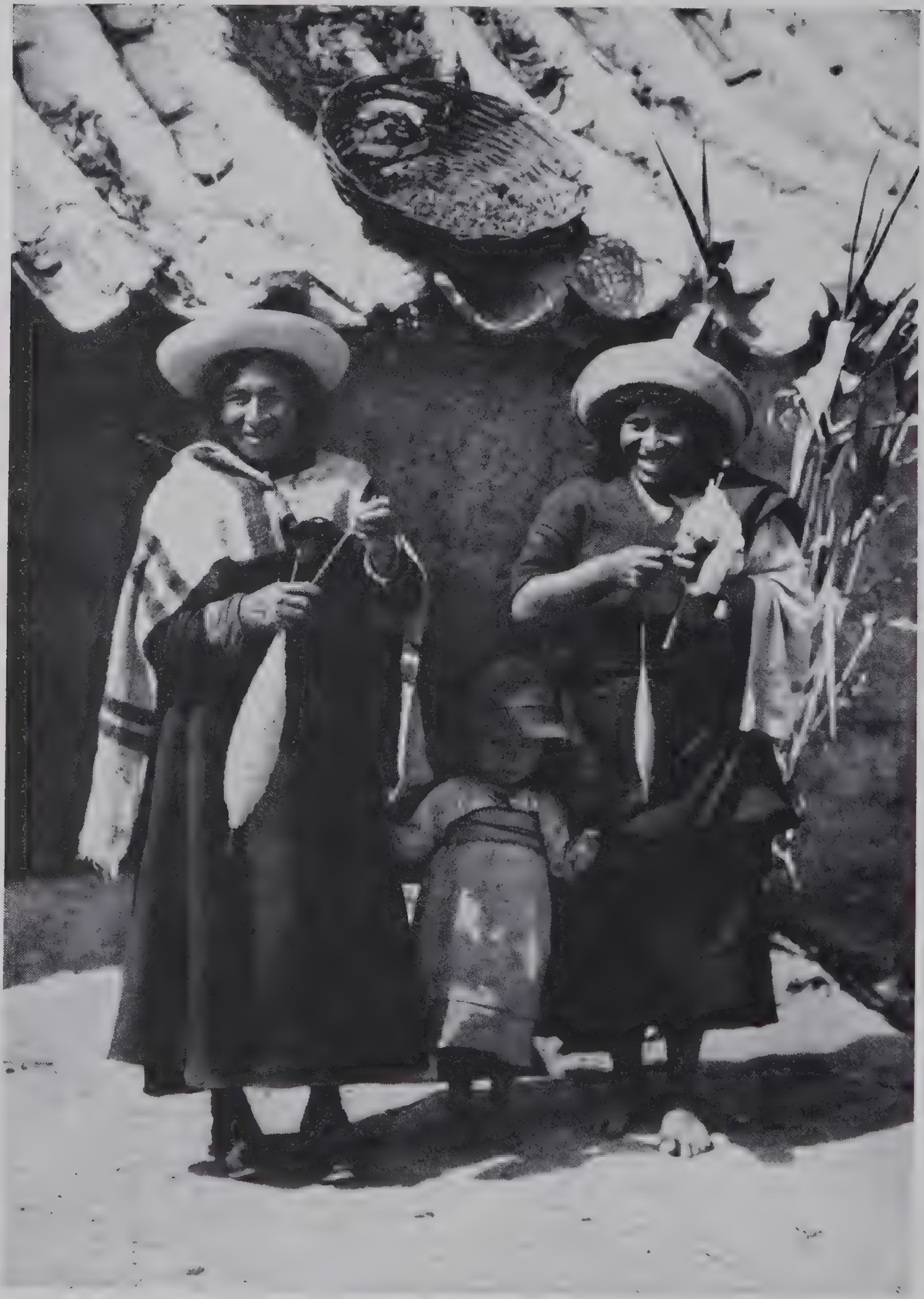
The Peruvian Government was not slow to take the hint. It has been slow to act because of financial conditions, but today an American engineer is in the employ of the government tracing out the lines of the ancient Inca systems. They are complete and practicable, and need only to be cleared of sand to restore to fertility the thousands upon thousands of acres which were once cultivated here.

As one ascends the Andes the rainfall increases, until on the other side of the triple summit a typical tropical jungle is to be found. But on this arid plain, for years dismissed as a useless desert, are to be founded the great farming projects of the immediate future in Peru.

A CORDIAL WELCOME FROM PERU

The Atlantic fleet entered the harbor of Callao, which is the principal Peruvian port, on January 31, and a week of good fellowship followed. One soon ceased to be cynical about the Peruvian welcome, or to look behind it for any motive of self-interest.

Every Peruvian one met said and seemed to feel that the United States is the great and good friend of his own



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SPINNING YARN FOR PONCHOS IN THE HIGHLANDS OF PERU

The progressive president of the Peruvian Republic finds that his greatest difficulty in advancing the prosperity of the Indian element of his country's population is the absence of a sense of "the need for something." The Indian of Peru wants almost nothing that he cannot produce himself. His little garden supplies him with food and the wool of a sheep or two provides his wardrobe.

republic. President Augusto B. Leguia voiced what appeared to be the sentiment of the nation:

"In all our dealings with other nations we have found the United States the only one whose actions have not been dictated by selfish interest," he said.

There is a startling absence of ceremony, too, in spite of the gold lace and elaborate trappings in which the officials of state came to pay their formal call upon the officers of the fleet. This little ceremonial was quite the equal in form and color of those one is accustomed to seeing in the European states.

The green and gold carriages in which President Leguia and the members of his cabinet drove through Lima's narrow streets glittered with plate-glass. A troop of cavalry clattered in front of and behind them.

A CALL UPON THE PERUVIAN PRESIDENT

But when I desired to call upon the President of Peru I was admitted to his presence without a tenth of the delay one expects to encounter in trying to enter the office of a country banker.

"I want to go to the office of President Leguia," I told the Indian non-commissioned officer in command of the half dozen soldiers at the door of the palace, across the great plaza from the cathedral in which Pizarro's bones lie in rather doubtful state, in a glass-sided casket which every visitor to Lima sees.

The non-commissioned officer waved me on. I crossed the wide patio and found another and was again waved on.

Eventually I reached a secretary, who spoke English and left me contemplating the red Turkey carpet and gold-legged chairs which are the invariable properties of a state chamber in Latin America.

Along one side, an open gallery shaded the president's office. From it one could look into a dusty and faded little patio, in which a few discouraged bushes struggled against the prevailing lack of water.

"Come this way," said the secretary.

President Leguia seems a sort of a Hoover in his own country. He is a slender, quick-spoken, frank-eyed man who made a fortune in business before he thought of entering politics. He speaks English very well, too, thanks partly to early training and partly to the fact that after he had been "revoluted" out of office and exiled he made his home abroad for some years. He is now engaged in trying to modernize his country, and to this end is engaging school teachers and surgeons and administrators and engineers from the United States.

DESIRE THE SECRET OF PROGRESS

"I believe," said he, "that the first step in progress is to need something."

There is no more docile, biddable, kindly man in the world than the Indian of Peru. But he wants almost nothing that he cannot produce himself. He usually holds a little "tierra" which has come down to him from his forefathers and which had been assigned to them by Inca law.

The produce of his little garden feeds his family, and the wool of a sheep or two, spun into yarn and woven into cloth by his wife, provides the domestic wardrobe.

A few pots are his household furnishings, and he sleeps at night in the blanket he draws around his shoulders by day. There seems almost no reason why he should work for money.

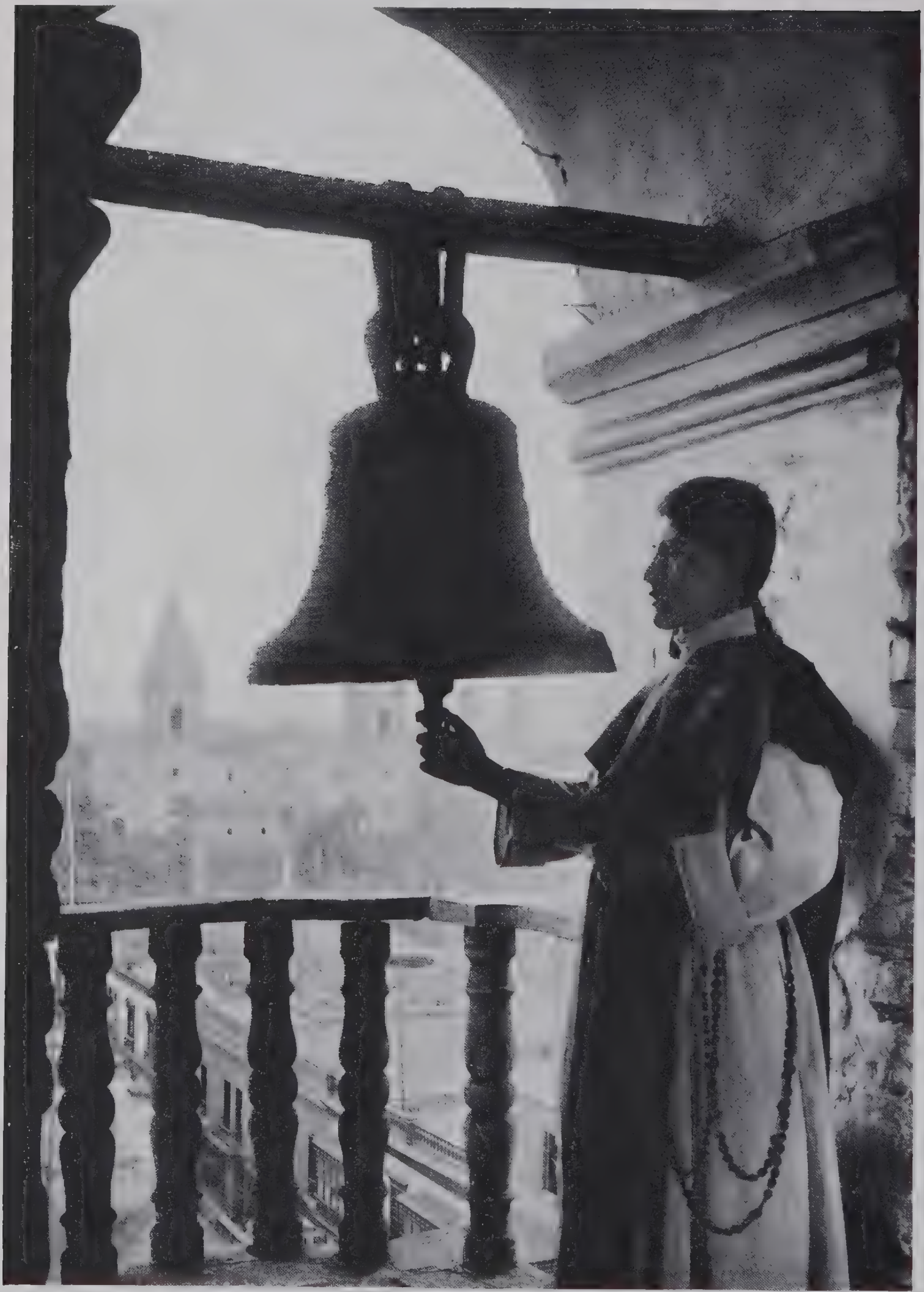
"So I am trying to teach him to want things," explained President Leguia. "When he feels he must have a Yankee alarm-clock and his wife demands a sewing-machine, he will be willing to work regularly. Then we can make some progress."

MAKING BATHS POPULAR

He illustrated his theory by a story. In an up-country mining camp the American managers wished to encourage the employees to bathe. They built a bath-house and equipped it with hot and cold water sprays, but the Indians regarded it as a further evidence of the incurable folly of all foreigners.

Then the Americans announced that those who bathed would be given tickets, and these tickets could be cashed in for five cents each. Soon every Indian was taking his daily bath.

"Now the Americans have reversed the process," said Mr. Leguia with a dry chuckle. "The Indians have formed the habit of taking a daily bath and cannot



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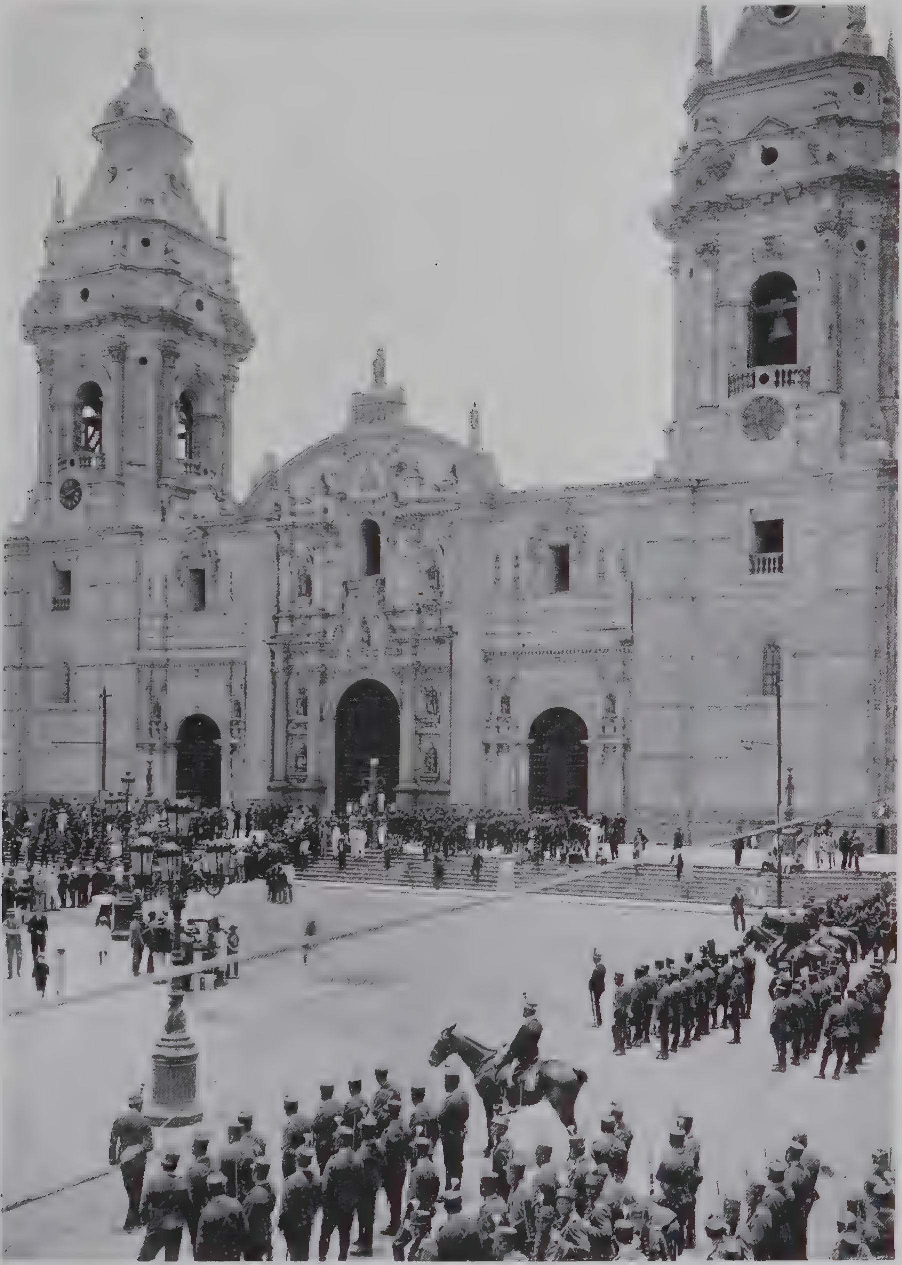
VESPER HOUR IN LIMA

From the bell tower of the Church of San Domingo the priest looks over the lovely city to the twin-towered cathedral in the distance. Pizarro gave to Lima the sobriquet "City of the Kings."



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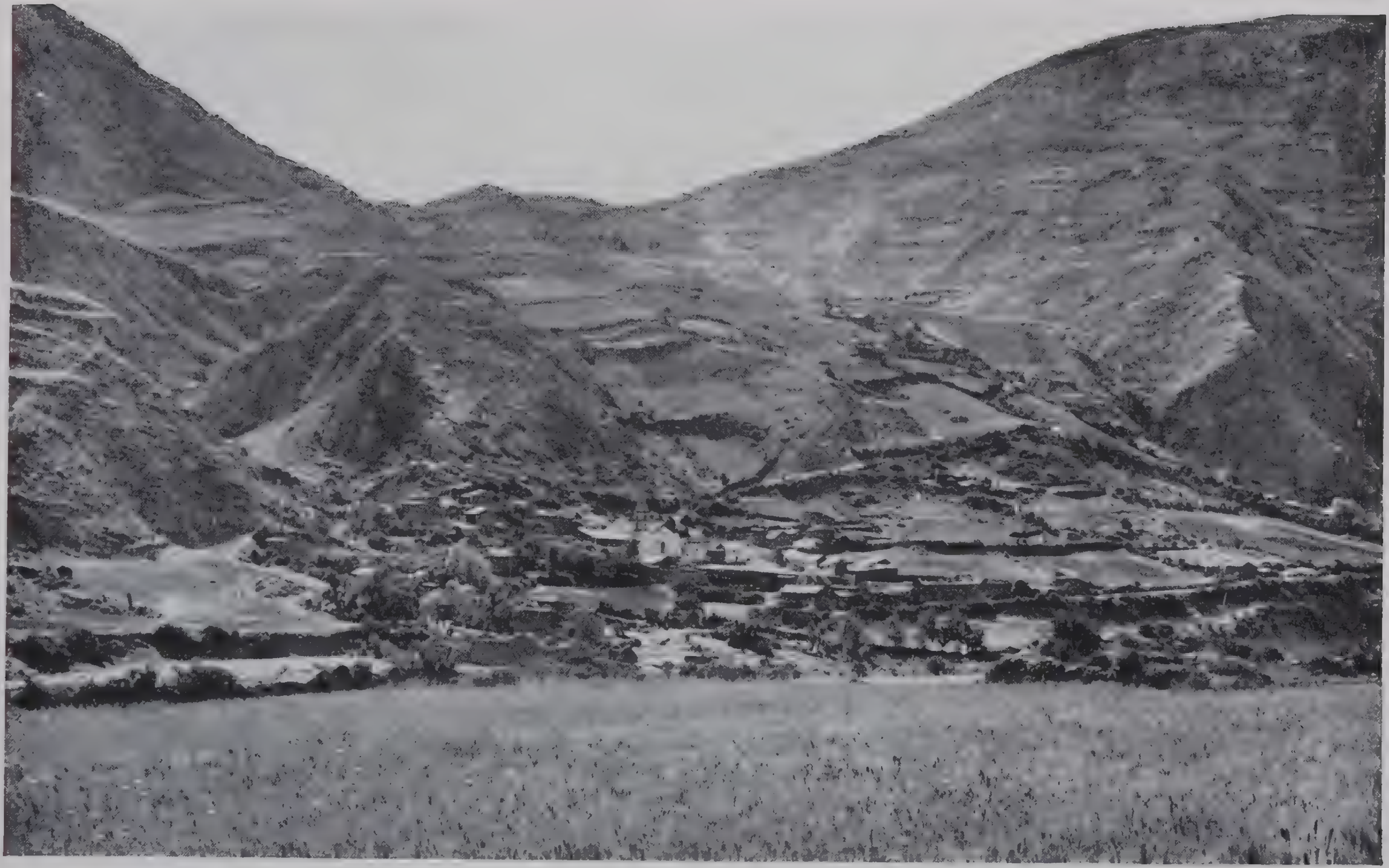
THE CATHEDRAL, LIMA, WHERE REST THE BONES OF PIZARRO

The reputed mummified body of the Spanish conqueror of Peru is contained in a glass casket in this handsome building of semi-Moorish architecture. It was Pizarro who founded the cathedral in 1535. Little remains of the original building, however.



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WHEAT-FIELDS AMONG THE MOUNTAINS OF PERU: THE TERRACES, WHICH ARE STILL CULTIVATED, WERE BUILT BY THE INCAS CENTURIES BEFORE THE ARRIVAL OF COLUMBUS IN THE WESTERN HEMISPHERE (SEE TEXT, PAGE 612)

It was in this country and among these terraces that the potato was born into the vegetable kingdom (see "The Staircase Farms of the Ancients," by O. F. Cook, in THE GEOGRAPHIC for May, 1916).

stop. So they work in order to get the five cents."

It is eight miles from Callao, the seaport, to Lima, the capital of Peru, but the sailors thought nothing of that. They had been provided by the Navy Department with concise little manuals, edited with the coöperation of the National Geographic Society, in which the things worth seeing had been set forth, a plan of the city given, and the monetary system explained. Armed with these, the men went where they pleased.

There were 13,000 men on the vessels of the fleet and most of them had several days' liberty, yet not one unpleasant incident marred the visit. It is true that now and then one met a sailor who was irrepressibly musical, and it is likely that the masters-at-arms had occasion to put a man or two in the "lucky bag" on each ship.

THE CONDUCT OF THE MEN OF THE FLEET INCREDIBLY GOOD

But the conduct of the fleet was incredibly good. Pisco is a white whisky which plays havoc with the unaccustomed, but after one trial the gob let pisco alone.

Every man gazed at Pizarro's bones and most of them had a working version of the Conquistador's life and achievements, and all seemed to know the story of his death.

"He'd a-killed all seven," one heard them say, "only his sword got stuck in the wishbone of one of 'em."

They walked endless miles through Lima's dusty streets and regarded open-eyed the Indian women who jounced in astraddle of little horses with milk-cans slung over the saddle bows, and winked harmlessly at the giggling girls who sheltered themselves behind iron grilles at the second-story windows.

At least every fourth man had a camera and they bought picture postcards tirelessly. All Peruvians smiled at them in a comradely way and the Americans were inspired to try their phrase-book Spanish on their hosts. Often it worked, too.

In every café one saw little parties about the round tables, laboriously working out an *entente cordiale*. Between times they grinned at each other and made motions to the brown boys who served drinks.

THE GREAT EVENT OF THE VISIT—THE BULL FIGHT

So far as the gobs were concerned, however, the great event of the week was the bull-fight. This was given by the Peruvian Government in honor of the American visitors, and Belmonte, who is one of the most celebrated Spanish matadors, played his spectacular part.

It was a superb bull-fight, as bull-fights go. The Lima ring is the largest in the world and the bull has more of a chance than he has elsewhere. The bulls were savage and active, too, so that in the very first fight an important section of Belmonte's skin-tight breeches was torn away and a red line appeared across his white skin.

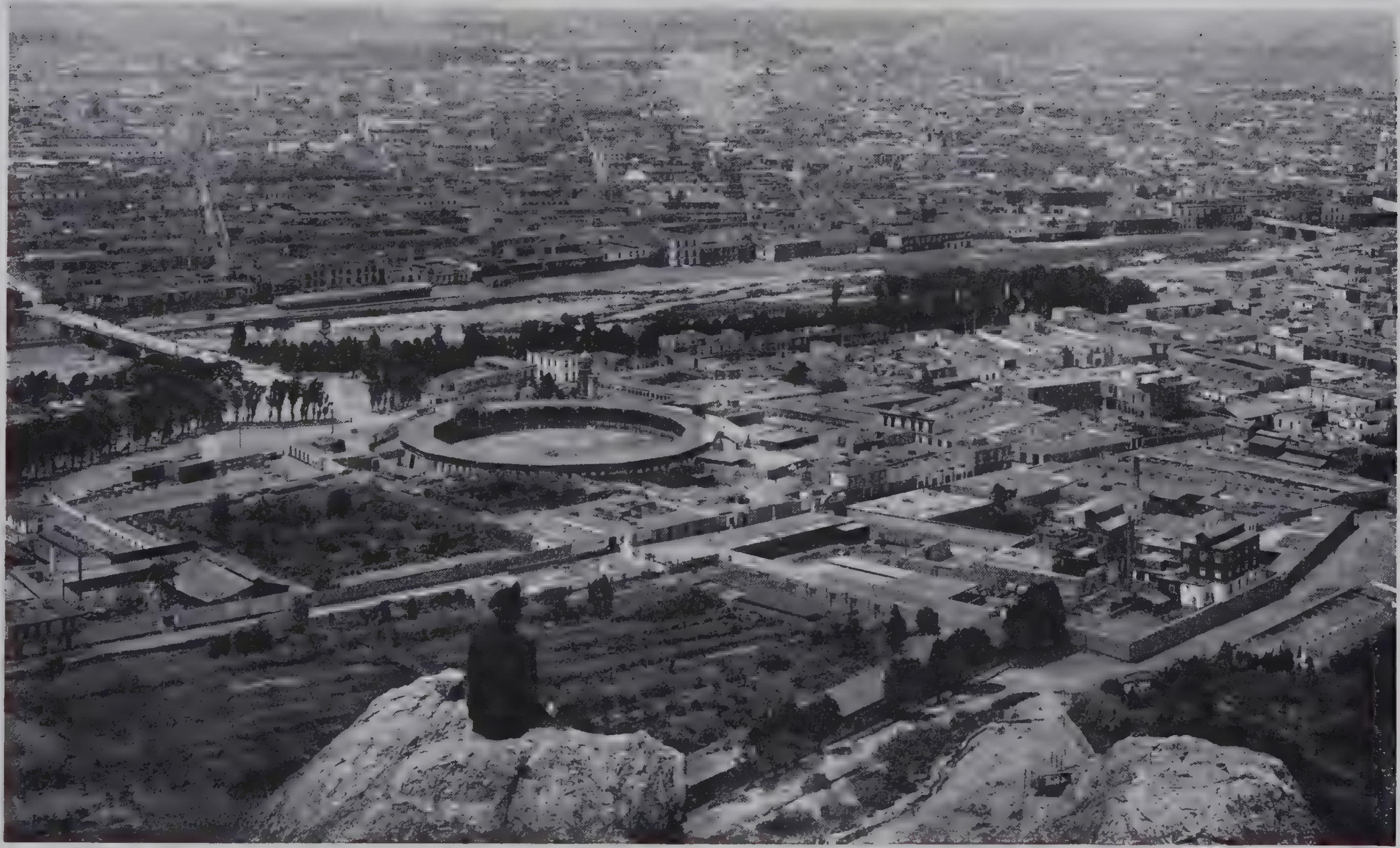
The sailors gasped. It was more than they had counted on, apparently. Then a horse was gored, and from that moment the sympathy of the sailors was definitely against the men who took part in this abhorrent torture.

"Go it, bull," they cried whenever a bull charged. "Go get him, bull."

A little brown bull was the real hero of the day, in spite of the gold-laced fighters and the splendor of the spectacle and the age-old ceremony with which the game of butchering bulls and torturing horses was carried out.

This animal gave some evidence of a reasoning faculty. He refused to charge the blindfolded horses, although they were wheeled broadside on to him by the red-capped attendants, and the heavily armored picadors yelled at him insultingly. He paid no attention to the red mantles that were flaunted in his face. But when he charged—and he charged freely—he went straight for the man who waved the flag.

In three minutes he had the ring cleared. The expensive matadors were sitting down behind the shelters smoking cigarettes. The men with the banderillas had climbed to the safety of the balconies. The picadors were silent and the poor old horses were asleep with their chins resting on their knees. So the door was opened and the little brown bull went triumphantly out.



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A BIRD'S-EYE VIEW OF LIMA, SHOWING THE GREAT BULL-RING, THE LARGEST IN THE WORLD

In this great arena a special bull-fight was staged for the entertainment of the men of the American Navy (see text, page 619).

"He was a cross-eyed bull," was the explanation that came up to us.

THE TAXI CHAUFFEURS WENT ON A STRIKE

Even the strike of the taxi chauffeurs did not disturb the happiness of the sailors. Ordinarily the chief delight of the seaman ashore is to pack as many exemplars of his profession as possible in some sort of a cab and then go careering. But the pilots of the four-seatos, who had contentedly served the Limans at a rate of one dollar and a half an hour, American money, for any sort of an automobile that would go, took umbrage at the act of the government in advertising in all the papers that the rate was one dollar and a half and no more, and advising the Americans to resist four-seato aggression.

Therefore they went on strike. They were still willing to haul a Peruvian at the old rate, but if they could not gouge the Yankees they would have nothing to do with them. It did not annoy the boys.

"We've seen taxi chauffeurs before," they said.

Hard work began with the departure of the fleet from Callao and the resumption of maneuvers, when the Pacific fleet joined those of the Atlantic squadron in those tragic waters which saw the crushing of Craddock's gallant British squadron by Admiral Von Spee's ships.

But it was not only the constant march and countermarch of the ships that was watched by the admirals of the fleet. The radio was continually crackling with admonitions to the engineer officer of this ship or that.

ENGINEERING WITHOUT SMOKE

First-rate engineering to a landsman means engineering without a breakdown, but on the sea it likewise means engineering without smoke. A plume of black can be seen by an alert enemy a score of miles away.

In the thirty-odd days I spent on board the flagship *Pennsylvania* I did not see enough smut come from her funnels to daub a lady's handkerchief. There were other ships which smudged the skies like so many factories.

Everything else is subordinate to shooting, on board an American battleship, however. No one can know whether our men are actually better marksmen than the gunners of other navies, but they assuredly believe they are.

The gun crews watch and gossip at target practice, and between times practice speed in loading and firing without orders from the officers.

One of the ships of the American battle fleet was once classed as a bad ship because her captain was a notorious sundowner—which may mean that he was tyrannical and unfair and may only mean that he was disliked.

The captain who replaced him established a "meritorious mast," so that men might be called in front of their fellows for praise as well as for blame. Then he began to preach better shooting.

"There isn't a better ship in the fleet," said the man who ought to know. "His men work with the guns all day long."

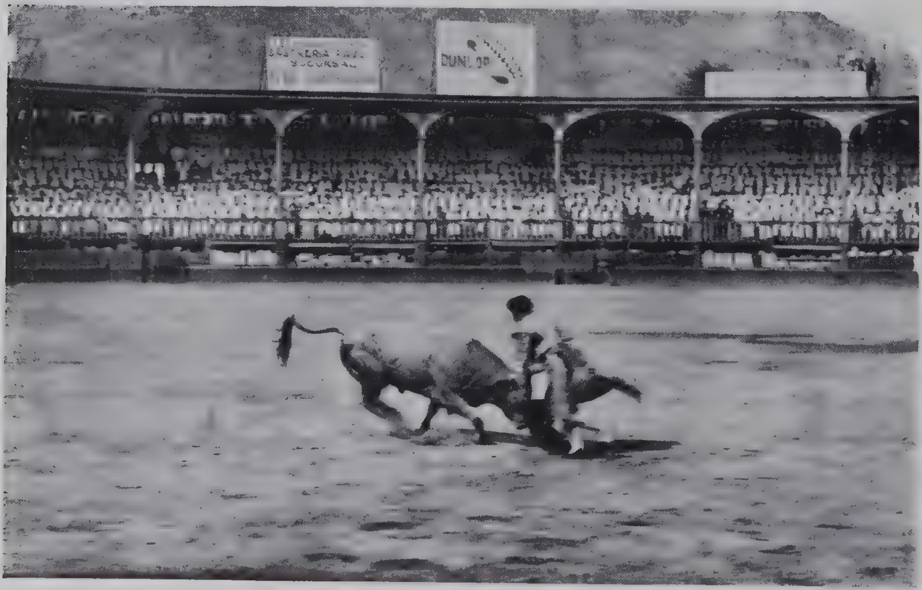
WHERE THE PROBLEM OF AIMING THE BIG GUNS IS WORKED OUT

Therefore I found occasional entertainment in that perspiring center known as the plotting-room. Here young mathematicians juggle with curves and logarithms to discover precisely how to hit the enemy's ship with the first salvo.

If they work out this problem accurately by the aid of adding-machines and established formulas, in the midst of jangling telephones and whistling speaking-tubes, the enemy's ship goes out of action in a beautiful burst of black and red. Otherwise the spotters in the fighting tops and in the ship-planes must take up the work of finding the range.

In getting the range, practically the only factors really considered are the presumed distance between the two ships, the speed at which each is going, the nature of the wind and the density of the atmosphere, and, last of all, the temperature of the powder-magazine. It seems almost too easy.

Upon returning to Panama the fleet paid its visit of ceremony to the ruins of Old Panama, precisely as it had to Pizarro's bones in Lima. The navy's look-see manuals informed the men that Sir Henry Morgan sacked the town in 1671, after struggling through the jungle for days.



Photograph from Herbert Corey

A CRITICAL MOMENT, WHEN THE "CROSS-EYED" BULL CHARGED (SEE TEXT, P. 619)

The members of the Atlantic fleet, for whose edification the spectacle was staged, occupy practically all the seats in that portion of the structure shown in the photograph.

Photograph from Ernest T. Fauroat

THE BULL-FIGHT AT ITS HEIGHT: LIMA, PERU

From the moment the first horse was gored the sympathies of the American guests were with the bull rather than with his human torturers. "Go it, bull!" was the cry which echoed from every tier of seats, as the animal would charge the gold-laced matador and the resplendent picadors.

Official Photograph, U. S. Navy

"MICKY" RECEIVING HIS MORNING BATH

On their way home after their visits to Peru and Chile, the men of the Atlantic and Pacific fleets acquired an amazing assortment of pets and mascots at Panama City. Pigs, ducks, parrakeets, dogs, rabbits, and even a tiger's cub were included in the floating menageries.

He seems to have been thoroughly modern in his financial theories. After capturing many mule-loads of gold, he had it all loaded on board his own ship. Then he set sail for the nearest port in which a responsible official could be found, bought a pardon and the knighthood which gave him his title, and then blithely set about hunting down his old comrades for the bounty which was then paid for buccaneering scalps.

One visit to Old Panama was enough, however, and once was enough over the rough country road that led to it through fields that gave evidence of the fertility of the Isthmus when the jungle is once cleared away, and between rows of tin-roofed shacks in which brown men and women mixed relentless drinks for all comers.

Some of the sailors carried their antiquarian researches so far as to visit the golden altar which had been taken from Old Panama in time to save it from Sir Henry Morgan's hands.

PETS OF ALL SORTS COLLECTED

Most of the men devoted themselves to the investigation of the town. Many bought the most extraordinary assortment of pets that even a longsuffering American battle fleet ever carried. Pigs and dogs and parrakeets and ducks and rabbits were taken aboard. One man even brought on board the *Pennsylvania* a tiger's cub, the tiger being of the Isthmian variety, of course. Then they were ready for the inter-fleet competition.

One result of the boxing matches was the development of perhaps the first Filipino champion in the person of Javier, a mess attendant, who won the flyweight boxing contest without the slightest difficulty and seemed competent to win a score more in the same ring. The Atlantic fleet won most of the boxing and wrestling and aquatic events, but lost the three baseball matches.

The fact is worthy of note, because it afforded opportunity for one of the finest exhibitions of sportsmanship one could ask to see.

TRUE SPORTSMANSHIP IN THE NAVY

The Atlantic fleet had a band of 195 pieces—the sort of band that made the listeners want to throw their hats and cheer when it played patriotic pieces—and a cheering section under the leadership of a young ensign, who once made New York talk about him instead of the Army and Navy football game, when he led his cheerers there. It also had an immense banner, one hundred odd feet long, with the letters A-T-L-A-N-T-I-C printed on it six feet high.

So the Atlantics were beaten. Through the series the gobs had rooted for their players as best they knew how. They had cheered defiantly and insultingly and they had cheered when cheers were needed to restore morale. Curly had thrown handsprings and turned flipflops and danced with the music. They had clapped their hands—a thousand of them, like this—tatatata, tatatata, tatatata, tata, tata, and they had driven the Pacifics utterly wild by wailing "Margie" at them. No one knows why the Pacifics so hate and utterly detest this harmless song of "Margie"; but they do.

Then the Atlantics were beaten. And that huge band crashed into a chorus that made the cold chills run up and down one's spine and brought the spectators yelling to their feet. The big banner with "Atlantic" on it, supported on boathooks by forty sailors, was paraded about the field, preceded by a cheering section of five hundred men and followed by a solid square of loyal Atlantics. Homage was paid to the victors, and then the Atlantics marched to the box where the admirals sat in state, and cheered while admirals and staffs stood in salute.

It was a fine and sportsmanlike thing to do.

Then the fleets parted for the winter's work with the guns.

Notice of change of address of your GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your August number, the Society should be notified of your new address not later than July first.*

FAMILIAR GRASSES AND THEIR FLOWERS

By E. J. Geske and W. J. Showalter

(With Illustrations in Color from Paintings by E. J. Geske)

THE dynasty of the grass family dates back to the days of the forefathers of the horse, the camel, and many others of the important herbivorous animals of the present day, and there is little doubt that the evolution of many animals into orders and forms of today was greatly facilitated by the advent of the grass family in the vegetable kingdom.

Today, of all the plants that cover our earth, grasses rank second to none in importance. In the matter of utility to man and beast, no plant or group of plants has ever played so great a part in the history of the world, and we may well say with Solon Robinson that "Grass is King."

The 10,000 species of the order, of which 1,300 are indigenous to the United States, are distributed throughout all the zones of the earth, and range in size from a few inches in height to veritable forest trees towering sixty feet and more.

Wherever rainfall sufficient to sustain plant life occurs, and at intervals of time not too distant, and with temperatures above freezing at least part of the year, some members of the family will be found. They readily adapt themselves to soil and conditions and flourish and propagate their kind.

Regions that afford ideal conditions are the great prairies of the United States and Canada, southern Russia, Siberia, the grassy plains of South America, and Africa.

THE BAMBOO IS A GIANT GRASS

Wherever the rainfall is insufficient for forests and the climate is not too arid, grasses prevail over all but the hardiest vegetation. In these areas often more than 90 per cent of the indigenous plant life belongs to the grass order, and, except where cultivation of some species has excluded its rivals, it is not uncommon to find from twenty to sixty distinct species inhabiting almost any locality.

Rice, wheat, corn, oats, barley, and rye are grasses. They enter so largely into the relations of mankind that the country which is best able to supply the world with these necessary articles of food commands the destinies of nations.

Several groups of grasses, like sugarcane, furnish sugar and its by-products. Brooms, paper, rugs, hats, and innumerable articles of commerce are made of grasses, and even houses are built and furnished with their products, not only in darkest Africa, but in many civilized countries.

The giants of the order are the bamboos, the great trunks of which furnish material for an endless number of articles of commercial importance. The pigmies are the various forage grasses, which furnish pasturage for domestic animals and beautify our parks and lawns.

Nor is the story of the merit of the grasses more than half told when it is related that they are "Man's bread and meat; many things good, and most things sweet."

GRASSES GUARD THE SOIL

Grasses are the overseers of the soil. What is more irresponsible than the sands of the seashore and of the desert? Driven hither and thither by every shifting wave and wind, they now drift here and lodge there. Now they bury forests, now they expose the bones of those who lie asleep in God's Acre, while in the waste spaces of earth the sand-storm overwhelms the traveler and his caravan.

If it were not for the grasses, the soil of hillside and plain would be as shifting as the sands of seashore and desert. Every raindrop would be a vehicle on which a grain of the soil would steal a careless ride down to the sea.

But the grasses pin the soil down to its duty. The barren hillside may become a mass of gullies and gulches, but where the grass is master, the soil becomes the faithful servant of man. Even the trees and the shrubs would not possess a sure footing, did not the grasses help hold down the soil around them.

Though of all plants the most common, the grasses are of all common plants the least known.

The story of the grasses begins long before the age of man. In the geologists' Book of Nature, there are records of grasses that gladdened the face of the earth in the days of the tiny eohippus, from which the horse is sprung.

Some of the grasses have served man so long and in turn have been served by him that they have become as powerless to live without him as he is unable to get along in comfort without them. Imagine corn and wheat fighting their own way through the years. How soon they would fail without a plow and a harrow and a cultivator to prepare their beds and fight their battles with the weeds.

But other grasses have fought for themselves so many generations that they ask naught of any one. These travel along the roadsides of the world, sending their seeds hither and yon, until they have effected a foothold by "peaceful penetration" in a thousand communities.

HOW GRASSES SEND THEIR SEED ABROAD

The bur grass sends its thorny seed burs far and wide, attached to some passing animal or human being. The terrell grass produces seeds encased in cork-like hulls, which float to new fields on the waters of the brook beside which it grows. Couch grass grows from the root as well as from seed, and sends its spear-pointed rootstalks up through many a new foot of soil.

The beach grass has long since learned the tricks of the sand in attempting to bury all that would bind it, and has worked out a plan for circumventing the resourceful wanderer. It rises out of the sand as fast as the dune can build itself up, and at the same time sends its roots downward until it clinches the dune to solid earth.

Many grasses spread like the couch grass, by runners or rootstocks, having a succession of joints, from each of which arises a shoot that shortly takes root on its own account and in its turn sends out other runners.

Others develop only fibrous roots, and usually, like orchard and panic grasses, are found in bunches or tufts.

The seeds of some species are undestroyed and undigested by the animals that feed on them and get their chance to build a new colony through these carriers.

GRASS SEEDS WITH BARBS

Some other kinds of seeds are provided with novel weapons for forcing themselves into the soil. They have a prickly callus which bears stiff hairs growing away from the point like the barbs from the arrow's head. Once the prickly point has penetrated the soil, to draw it out is difficult, since the stiff hairs, rubbed the wrong way, interpose a strenuous objection.

A strong, bent contrivance, known as an awn, and twisted like a rope, is used by some grasses to bury their seeds in the ground. The rope-like twist is influenced by dampness and dryness—it uncoils when damp and coils again when dry. This acts as a motor to drive the seeds into the ground.

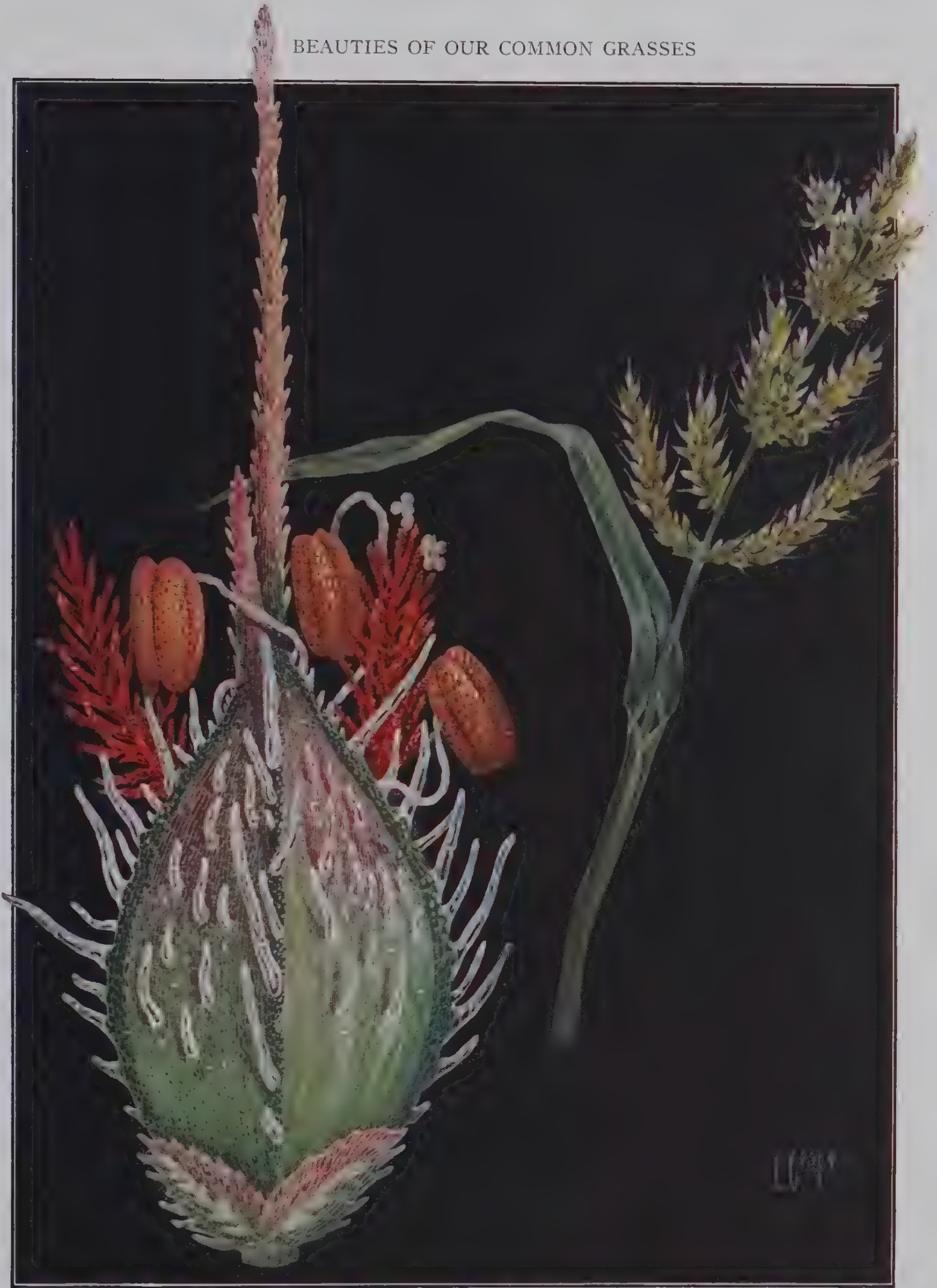
In high latitudes and corresponding altitudes, where the ripening of the seeds is uncertain, entire spikelets are transformed into leafy shoots, provided at the base with rootlets ready to grip the ground and grow wherever they fall.

What wonder that, in view of all these devices, one feels like saying of them as Darwin said of the schemes to which the plants resort in order to insure cross-fertilization: "They transcend in incomparable degree the contrivances and adaptations which the most fertile imagination of the most imaginative man could suggest, with unlimited time at his disposal."

WHY GRASSES HAVE JOINTS

Every one has noted what are popularly known as the "joints" of grass, but which are technically described as "nodes." Their mission is not, as most people believe, to give strength to the stem, but rather to help it always to stand upright.

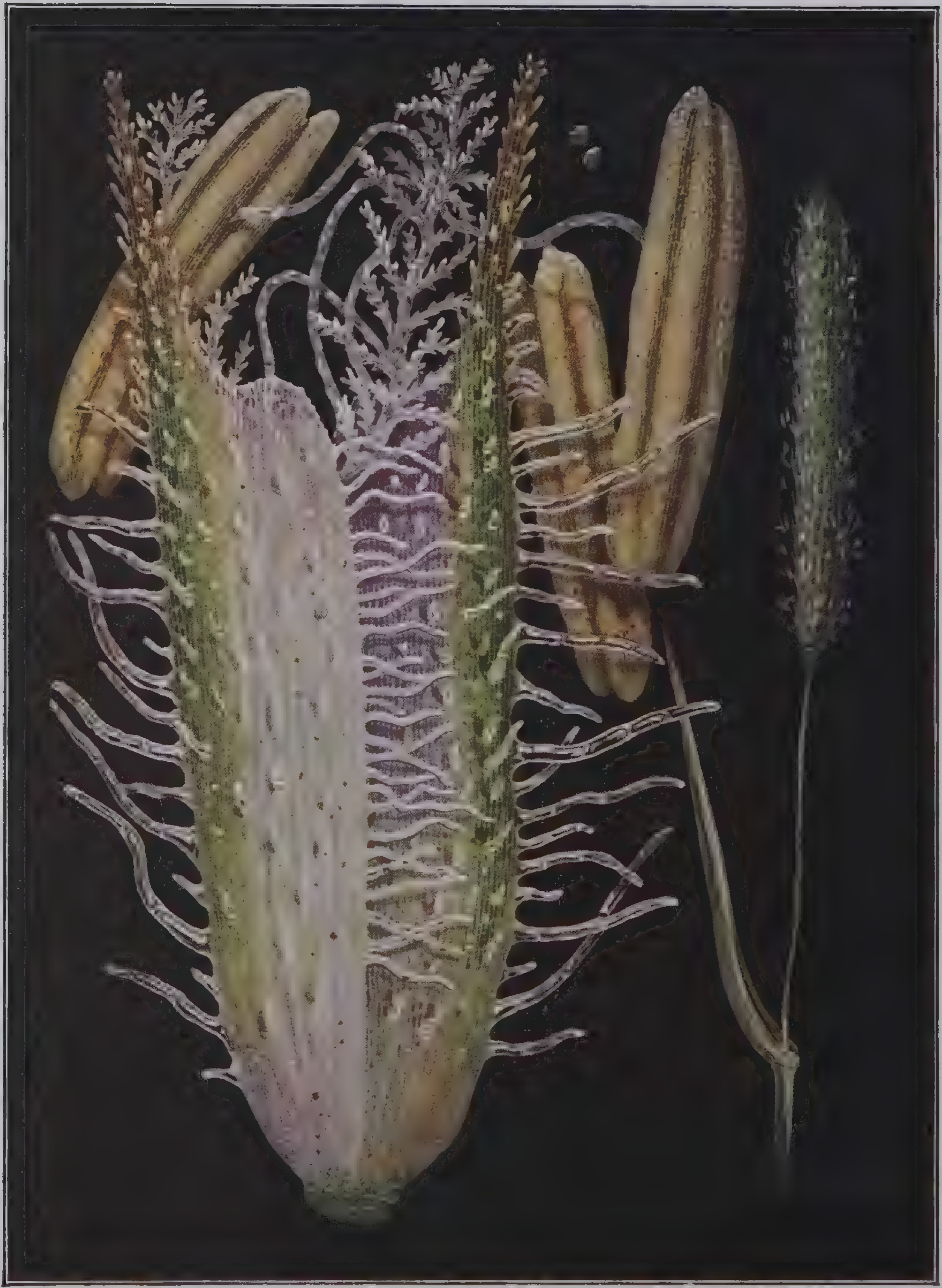
The cells of these "nodes" are known as "geotropically sensitive"—attracted to the earth or driven from it. A wind comes along and bends the grass, so that it becomes unable to resume its upright position. Thereupon the cells in the "node" on the side of the stem that inclines toward the earth begin to lengthen, thus, by imperceptible degrees, lifting the stem to its upright position again.



The Illustration Magnifies 30 Diameters

BARNYARD GRASS (*Echinochloa crusgalli*)

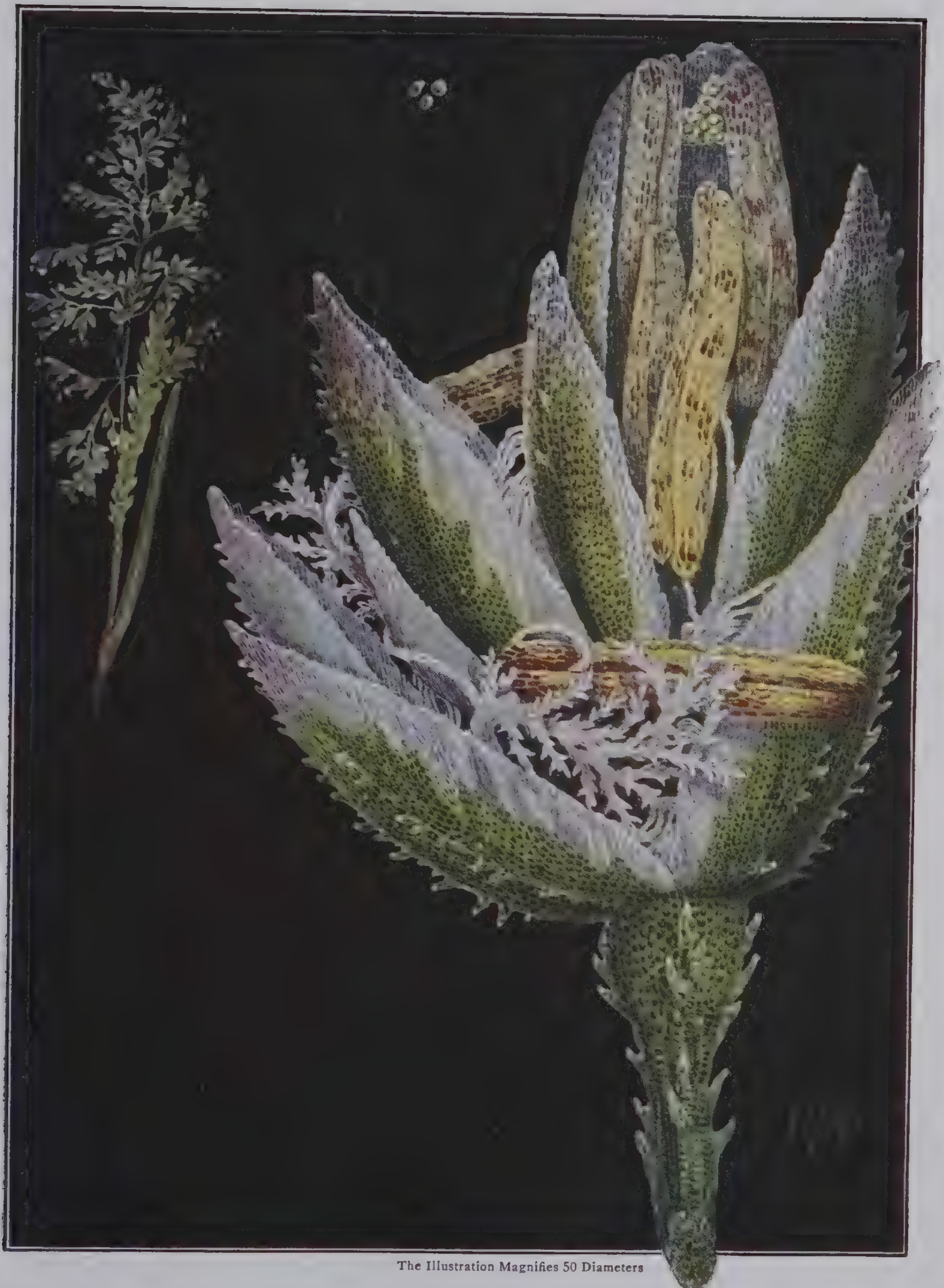
The familiar barnyard grass is a strong-growing annual, one to four feet in height, having wide leaves. It grows in moist or well-manured soil. The flowers occur in a compound raceme, or cluster, of spikelets and have long and very rough awns (beards or bristly appendages). The feathery stigmas are crimson and showy. Flowers appear from August to October.



The Illustration Magnifies 50 Diameters

TIMOTHY (*Phleum pratense*)

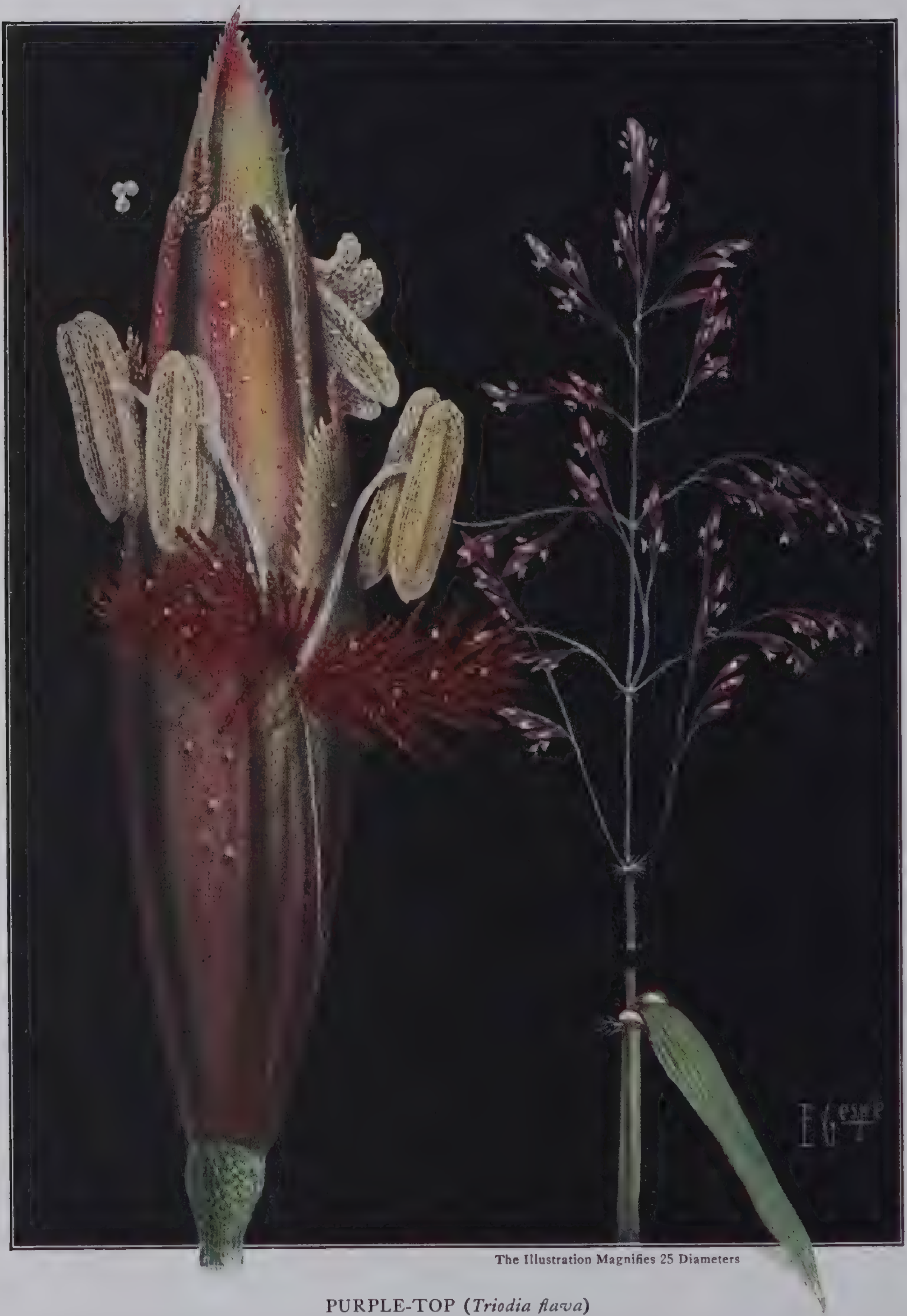
Timothy is said to have derived its name from Timothy Hansen, of Maryland, who introduced it into the American Colonies from England in 1720. It is a native of Europe, but is now widely distributed throughout the world. It is the standard hay grass of temperate regions. The flowers are arranged in a dense spike about three or four inches long and containing several hundred flowers.



The Illustration Magnifies 50 Diameters

KENTUCKY BLUEGRASS (*Poa pratensis*)

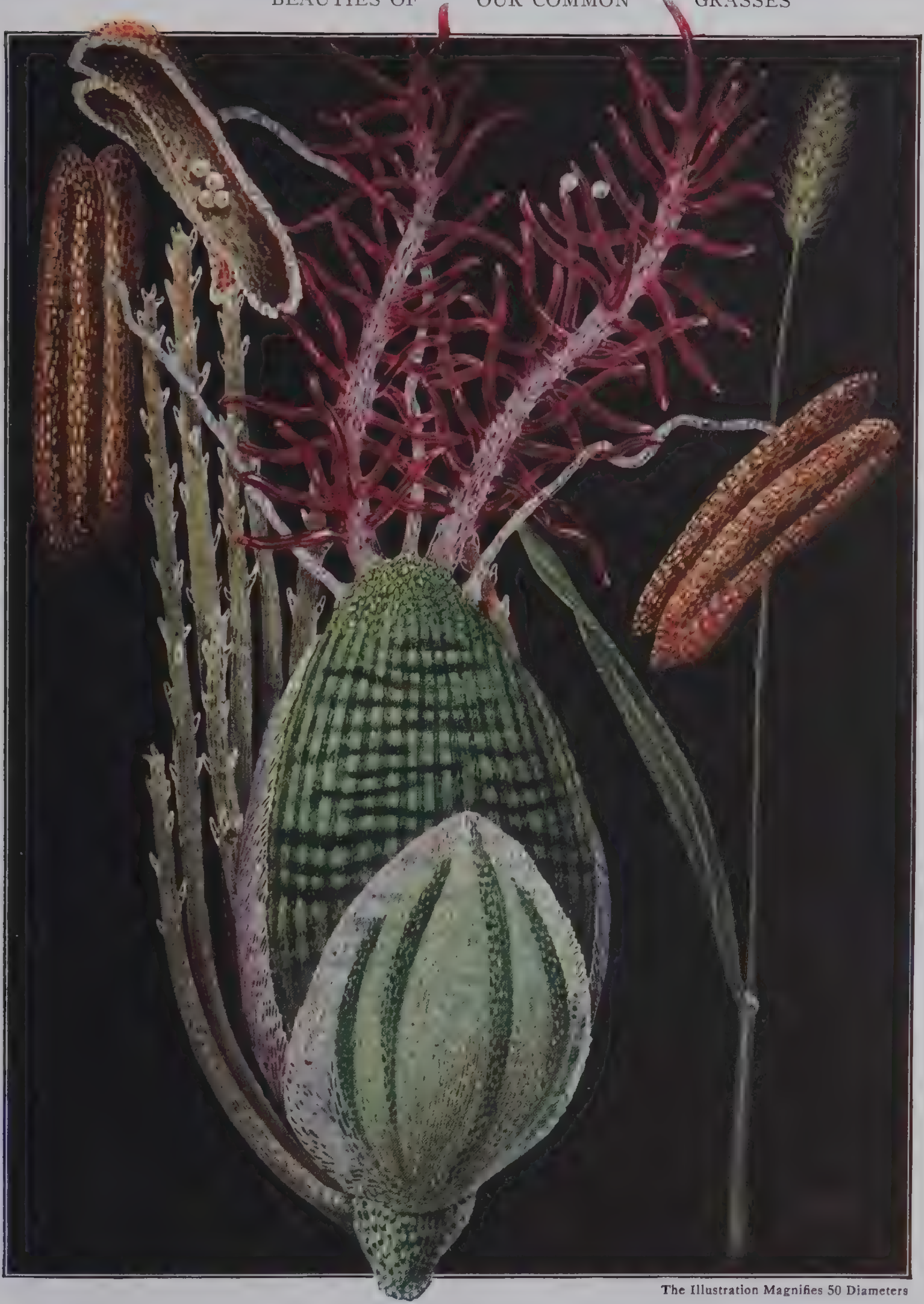
Kentucky bluegrass is a meadow grass of high order and unequaled for pasturage. It is also a favorite lawn grass where the soil is fertile, there is plenty of moisture, and the sun is not too hot. It blooms in May and June and the flowers occur in a loose panicle, or tuft, of spikelets, each spikelet having three to six flowers.



The Illustration Magnifies 25 Diameters

PURPLE-TOP (*Triodia flava*)

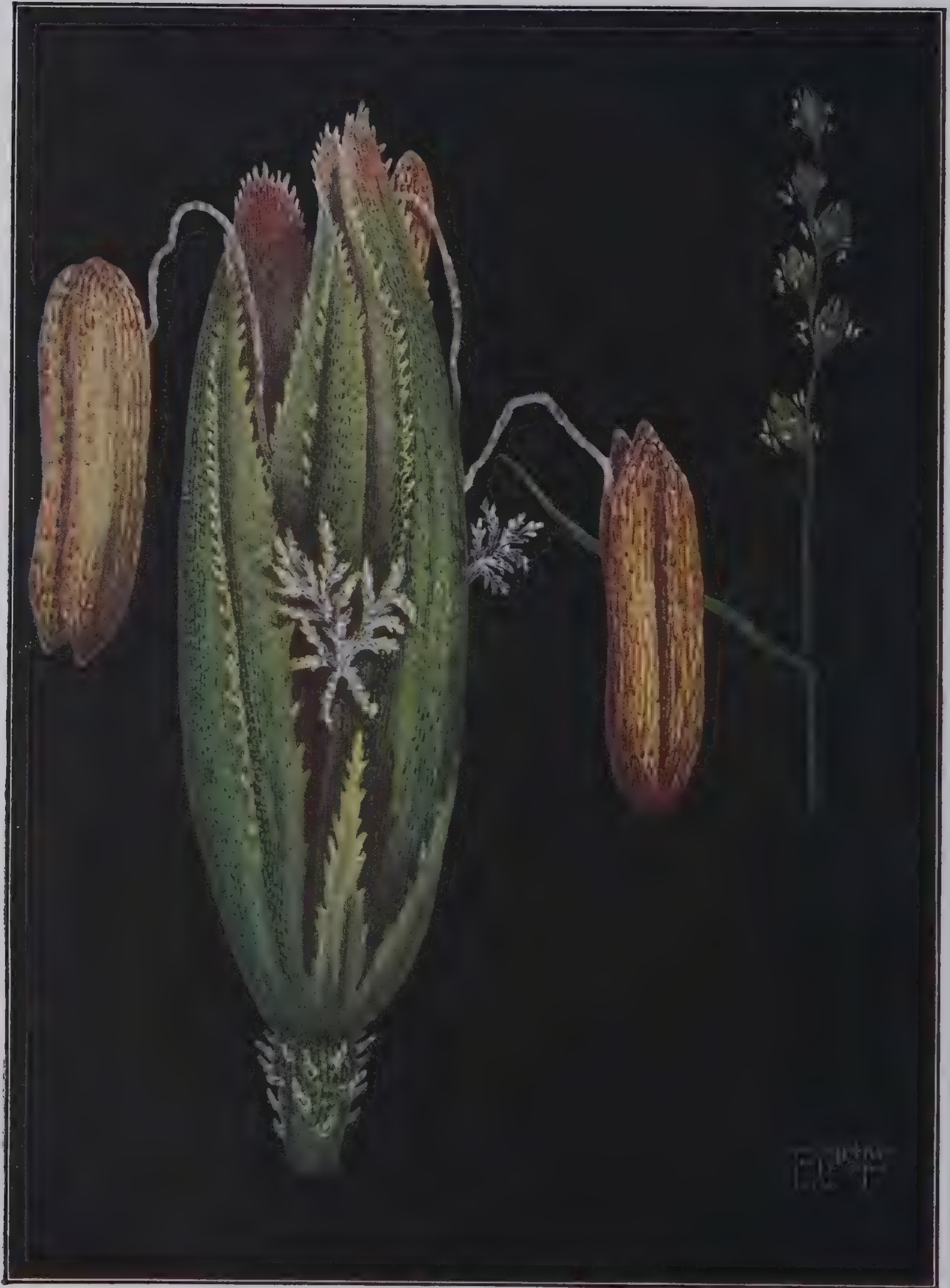
Purple-top is a perennial growing to the height of 3 to 5 feet, with smooth, flat leaves. It is found in dry fields from southern New York, the Ohio Valley and Missouri southward. It is a very showy grass with large panicles of flowers which occur in 5- to 7-flowered spikelets. The glumes, or husks, are deep purple and shining, and the feathery stigmas almost brown, standing out in strong contrast against the bright green of the stem and foliage.



The Illustration Magnifies 50 Diameters

YELLOW FOXTAIL (*Chaetochloa lutescens*)

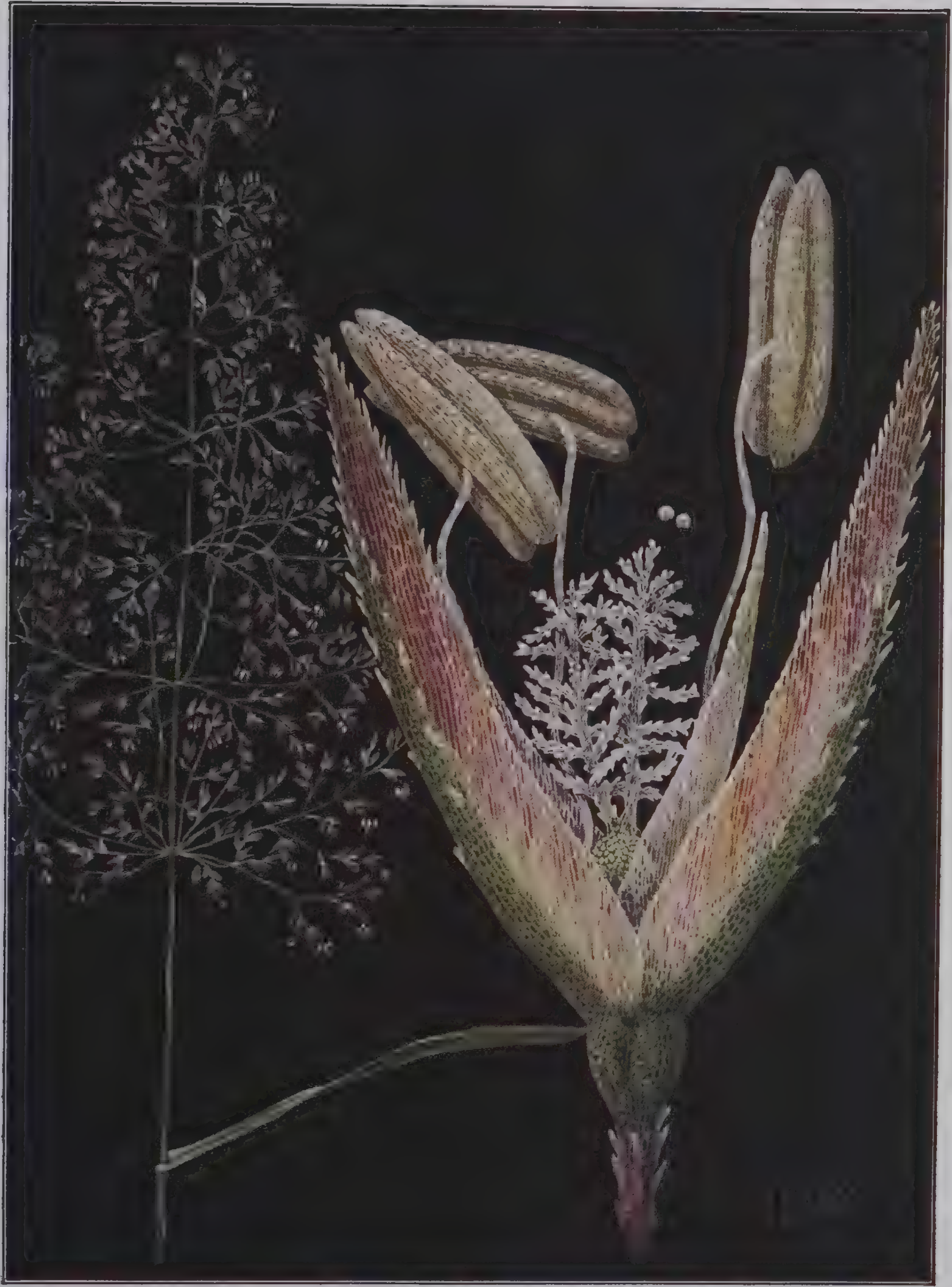
Yellow foxtail is a smallish plant commonly found in cultivated fields as a weed. The flowers grow in a dense cylindrical spike of a yellowish color. A cluster of bristles accompanies each floret, the coloring of which is delicate and beautiful. The perfect flower is transversely wrinkled, and surmounted by stigmas of a ciliate character (marginally fringed with hairs), beautifully colored. "Pigeon grass" is a name used in England for this plant.



The Illustration Magnifies 50 Diameters

RYE-GRASS (*Lolium perenne*)

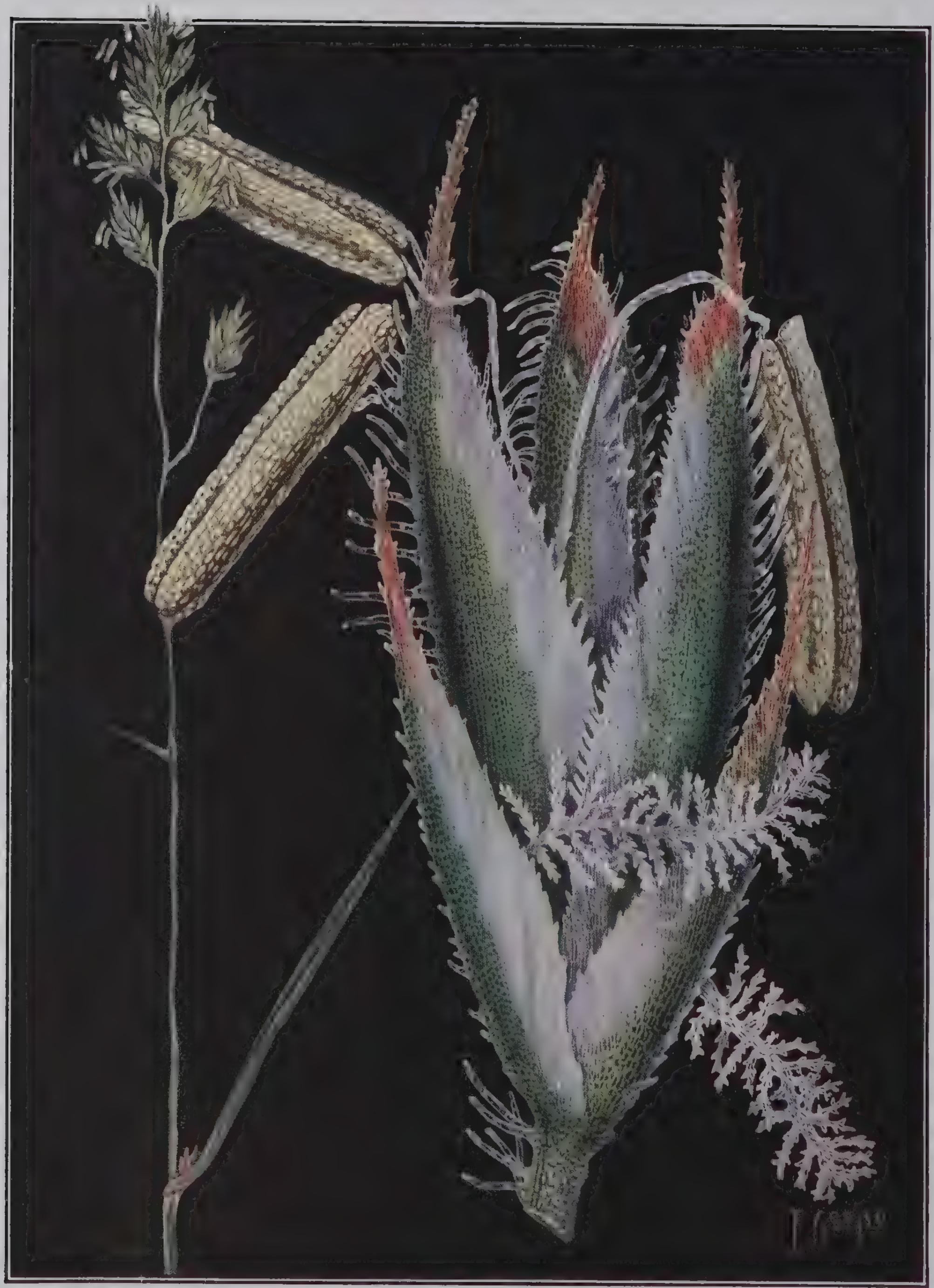
Rye-grass is a perennial with flowers occurring 8 to 15 in spikelets situated alternately on the rachis, or axis. It grows in fields and lots and is commonly considered a weed. Its blooming period is in June. Found mostly in the eastern part of the United States, it was introduced from Europe, where it occurs in numerous varieties.



The Illustration Magnifies 54 Diameters

REDTOP (*Agrostis palustris*)

Redtop is a favorite perennial forage grass of the northern States, where it is much cultivated. Its flowers occur in a cone-shaped open panicle. The glumes are green and whitish or oftener with a reddish blush, which has given rise to the name "redtop."



The Illustration Magnifies 25 Diameters

ORCHARD GRASS (*Dactylis glomerata*)

Orchard grass is a stout perennial growing in fields and yards, and attaining a height of three feet. The flowers occur in 3- and 4-flowered spikelets forming a dense, branching panicle. In early spring it affords good pasturage. Flowers appear in June, the flowering stem growing out of a dense tuft of broad leaves.

Nowhere else will one get a more striking picture of why botany seems a hard study to the layman than in the names of the different parts of a stalk of corn. The tassels are the stamens, the ear is a "spike borne in the axils of the leaves," and the grains are "the fertile flowers." The corncob is a "thickened rachis." The chaff covering the cob is "the flowering scale and palet," and the silk forms "the elongated pistils of the flower."

One of the most interesting of all the wars that Nature stages is the struggle between the grasses and the trees. Go where the forest and the prairie meet and watch the efforts of the timber to drive wedges into the grasses' lines; and observe the counter-offensives of the grasses in gaining footholds on the treeward side of the No Man's Land of the battle zone.

Strategy and tactics alike enter into the struggle. There is nothing of the barbarity of the frost and forest struggle, for neither attempts to dislodge the other; each seeks only to outlast the other and to prevent the other from bringing in reinforcements.

UNDER THE EYE OF THE MICROSCOPE

Under the eye of the microscope one may see something of the true glory of the unpretentious grasses, and in the accompanying color series the power of our eyes has been multiplied so that we may discern something of the beauty that lies hidden so deep that the cursory glance is not privileged to behold.

We are told a great deal about the beautiful green of lawn and meadow, but little is known by the layman of the gorgeous and often grotesque flowers, for they can only be seen to advantage under the microscope.

The flowers of most of the smaller grasses are perfect, and their component parts are readily comparable to the larger and better-known flowers.

In grass flowers the petals and sepals are replaced by glumes; there are usually three anthers and an ovary or pistil surmounted by one or two stigmas, these latter often branched and feathery in form.

When seen under the microscope at moderate enlargement and with reflected lighting, the color effect and structure suggest a delicate piece of beaded work profusely jeweled and built into fantastic forms and designs.

From their extreme delicacy it follows that the superficial parts of the flowers are semi-transparent, the colors being iridescent or those of one part glowing faintly through the translucent cell walls of the overlying parts. Words are inadequate to do justice to their beauty.

In the smallest enlargements of the accompanying color series of illustrations, one square inch becomes slightly more than four and one-half square feet; in the largest, we are able to look at the grasses under a magnification which is equal to stretching a square inch into twenty and one-quarter square feet, or to expanding one square yard into something more than half an acre.

If one could see familiar objects on a like scale of magnification, a normal man would be half as high as the Washington Monument and a mouse would become almost as big as a horse.

BARNYARD GRASS (Echinochloa crus-galli) [Plate I]

The familiar barnyard grass sometimes known as cockspur grass is a strong annual, growing from one to four feet tall, possessing wide leaves, and having an affinity for moist, rich soil. The flowers appear from August to October. The plant flourishes throughout North America except in the extreme north.

TIMOTHY (Phleum pratense) [Plate II]

There is no grass of the field more familiar than the timothy, with its tall, bright green stalk, its succulent blades, and its cattail head. It is the most prized among the haying crops, bringing a higher price per ton than any of the other grasses. In good land, timothy often grows to a height of five and six feet and its heads attain a length of from six to ten inches. The average timothy head is, perhaps, four inches and contains several hundred tiny flowers. The pollen, dashed with lavender, disperses with the slightest touch and is borne on the wings of the wind on its mission of fertilization.

Timothy is a provident grass. During the days of abundant moisture in the ground it stores up nutriment in bulbous thickenings at the base of the stems, which enables it to survive periods of drought better than the majority of its companions of the field.

Timothy seed is one of the lightest of the grass family, and many a farmer allows acres to pass the haying time in order that the seeds may develop. Usually the timothy harvest comes after wheat and rye are in the barn.

It is believed that timothy gets its name from a Maryland planter by the name of Hansen—Timothy Hansen—who is supposed to have imported the grass from England in 1720.

KENTUCKY BLUEGRASS (Poa pratensis) [Plate III]

Though attaining its most luxuriant growth in the far-famed bluegrass region of Kentucky, whose limestone soils also produce Burley tobacco, fat cattle, and fleet-footed thoroughbreds, Kentucky bluegrass is by no means limited in its habitat to the State that was once the "Dark and Bloody Ground." Indeed, it is one of the most common of American grasses and claims for its domain almost every limestone area from the Atlantic to the Pacific.

The habit of the bluegrass in spreading by sending up a running rootstock renders it an ideal lawn grass, since it so readily forms a fine turf. It blossoms in June, ahead of the summer grasses, the flowers occurring in a loose panicle of spikelets, each spikelet possessing three or four flowers. In dry or sandy soil the grass is unprosperous-looking and harsh, but where the limestone pasture-land has sufficient moisture it grows from two to four feet tall and makes that happy time which is known as "knee-deep in June."

PURPLE-TOP (Triodia flava) [Plate IV]

Purple-top is a perennial, growing from three to five feet in height, with smooth flat leaves. It is found in dry fields from southern New York and Missouri southward. It blooms in August and September, along with the purple eragrostis, and towers above its associates, the busy panic grasses and the slender paspalums. It comes at a time when it can share the sunshine with the pennyroyal and the other mints which are so often found in its neighborhood. The flowering head of the purple-top is somewhat sticky to the touch.

YELLOW FOXTAIL (Chaetochloa lutescens) [Plate V]

Belonging to the foxtail group, which includes the millets, this grass is widely distributed. It is very attractive when studied carefully, for the dense, yellowish cylindrical spike is full of florets, each accompanied by a cluster of bristles the coloring of which is delicate and beautiful. The perfect flower is transversely wrinkled and surmounted by beautifully colored stigmas.

The millets, cousins of the yellow foxtail, were among the most ancient of cultivated grains. Even the lake dwellings of the Stone Age reveal such quantities of these grains as to lead to the conclusion that they must have yielded the principal bread supply of prehistoric men.

RYE-GRASS (Lolium perenne) [Plate VI]

Rye-grass is a perennial, growing in fields and lots, and is commonly considered a weed. Its blooming period is in June. Rye-grass is found mostly in the eastern part of the United States and is probably an emigrant from Europe, where it occurs in numerous varieties.

Rye-grass has the reputation of being probably the first of the grasses cultivated as a forage plant, and since the days of Charles II has been held in high esteem in England. In America other grasses have answered so well the needs of the farmers that the rye-grass does not figure in his cropping system.

A cousin of Lolium perenne—Lolium temulentum—is supposed by some to have been the tares among the wheat mentioned in the Gospel according to St. Matthew.

In Scotland the seeds of the Lolium temulentum, commonly called darnel, bear the name of "sleepies," on account of what was supposed to be the narcotic effect of its seeds. Scientific investigation has revealed the fact, however, that this effect is produced only by those grains which have become diseased through the attack of a fungus.

REDTOP (Agrostis palustris) [Plate VII]

There are few more interesting grasses than the redtop. It belongs to the bent grasses, which are a group made up of hundreds of species scattered throughout the temperate zones. They monopolize the field and wayside in midsummer as thoroughly as the goldenrod rules the landscape of autumn.

The redtop clothes the land in iridescent tones of reddish purple. One variety used to be known as "bonnet grass" and is found extensively along the reaches of the Connecticut River. It derived its name from the thrifty habits of the New Englanders of yesteryear, who braided the stems into hats.

The flowers of the redtop occur in cone-shaped panicles, while the glumes are green and whitish with a reddish blush reaching its deepest note in the redtop. The illustration shows an albino form of this species.

ORCHARD GRASS (Dactylis glomerata) [Plate VIII]

One of the earliest of the grasses that gladden the springtime is the orchard grass. The English call it cocksfoot grass because of a fancied resemblance of the branching panicle to the rooster's foot.

This plant is a living example that even among the grasses the prophet usually receives his first recognition abroad; for, although it was brought from England to America, it was never appreciated in the mother country until it acquired its abode here.

The orchard grass spreads its flowering panicles to the winds in the days when the odor of new-blown clover sweeps through the land, and with its anthers ranging from purple and yellow to terra-cotta and pink, depending upon the quality of the soil and the quantity of light, it is no mean rival of the clover for recognition.

This species ranks high as a farm grass, since it offers the husbandman pasture for his herds in the springtime and is one of the last to retire before the cavalry of Jack Frost, which precedes the infantry and artillery of Winter.

The flowers of orchard grass are in their glory in June, the stem growing out of a dense tuft of broad leaves.

A NEW NATIONAL GEOGRAPHIC SOCIETY EXPEDITION

Ruins of Chaco Canyon, New Mexico, Nature-Made Treasure-Chest of Aboriginal American History, to be Excavated and Studied; Work Begins This Month

(With illustrations from photographs by Charles Martin, of the National Geographic Society Reconnaissance Party of 1920)

THE National Geographic Society announces the sending out this summer of an expedition to undertake extensive excavations and studies in the Chaco Canyon of northwestern New Mexico. This expedition hopes to discover the historic secrets of a region which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings whose ruins are ranked second to none of ancient times in point of architecture, and whose customs, ceremonies, and name have been engulfed in an oblivion more complete than any other people who left traces comparable to theirs.

Through the findings of this expedition, which begins its work this month (June), the National Geographic Society expects to reveal to its members a shrine of hidden history of their own country.

Both in scientific value of its findings and by adding a new chapter to the progress story of the human race, this project promises to rival such expeditions of The Society as that which dug out the marvelous city of the Andean ancients, Machu Picchu, or that which added to North America's known spots of majesty and seeming magic, the now famous Valley of Ten Thousand Smokes, in the vicinity of Titan Katmai.

A POPULOUS ISLAND IN SEA OF SAND

Chaco Canyon is that segment of the Chaco River which is cut out near the borderland of San Juan and McKinley counties, New Mexico. Its sheer, but sometimes crumbling, walls of sandstone rise from its floor anywhere from 100 feet to a height nearly equal to the United States Capitol dome. From their upper ledge stretch semi-desert wastes, making for an isolation which adds another mystery to the bygone metropolis of the canyon's maw: Whence came the lumber to build and whence the water to cultivate the corn, beans, and squash of these aboriginal farms?

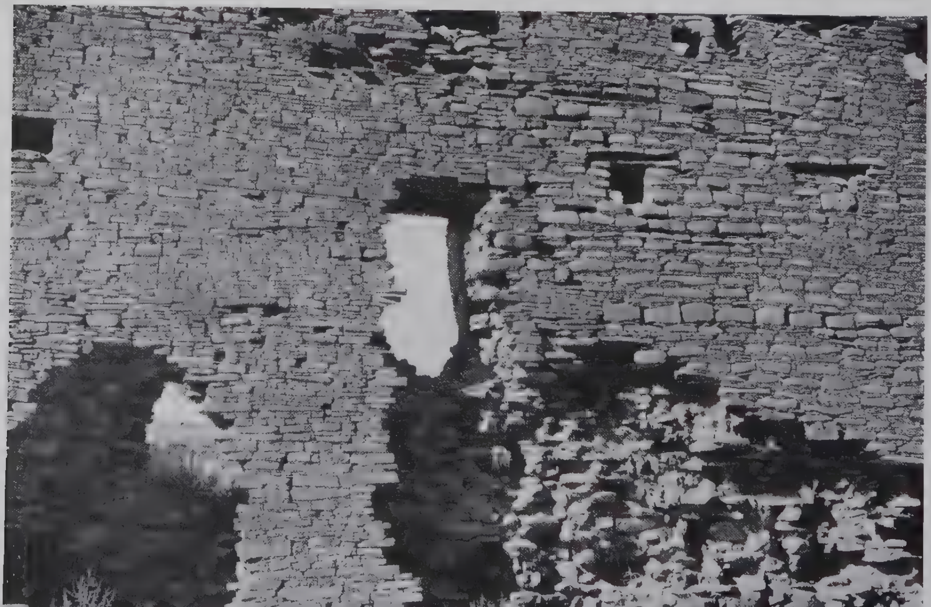
To answer questions like these, the expedition not only will include archeologists, who will study periods of habitation and the origin of the tribes, but also will have agriculturists and geologists, who hope to patch from a crazy-quilt of half-submerged ruins a complete picture of the lives, customs, and culture of these early Americans.

A GIANT CANAL CARVED BY NATURE

From an airplane this gash in the desert surface might resemble a magnified sector of the Panama Canal. Closer inspection would disclose, however, not an expanse of water, but an unwatered canyon, in or bordering which are a dozen huge ruins that look to the casual observer like remains of giant apartment-houses, containing hundreds of rooms, with associated temples or sanctuaries, known as kivas, and lesser dwellings, the true significance of which is not yet known.

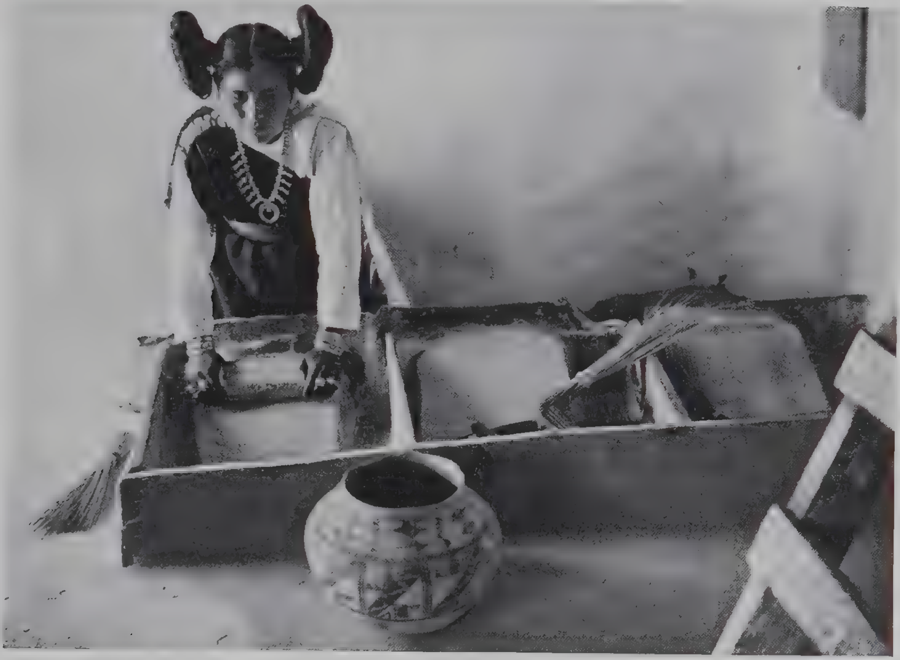
More astounding still, some of these larger structures, such as the Pueblo del Arroyo (arroyo—wash), one of the two ruins upon which The Society's expedition is to concentrate its investigations, are built after the familiar E-shaped ground plan of the modern office building,

PUEBLO BONITO FROM THE NORTHEAST: CHACO CANYON

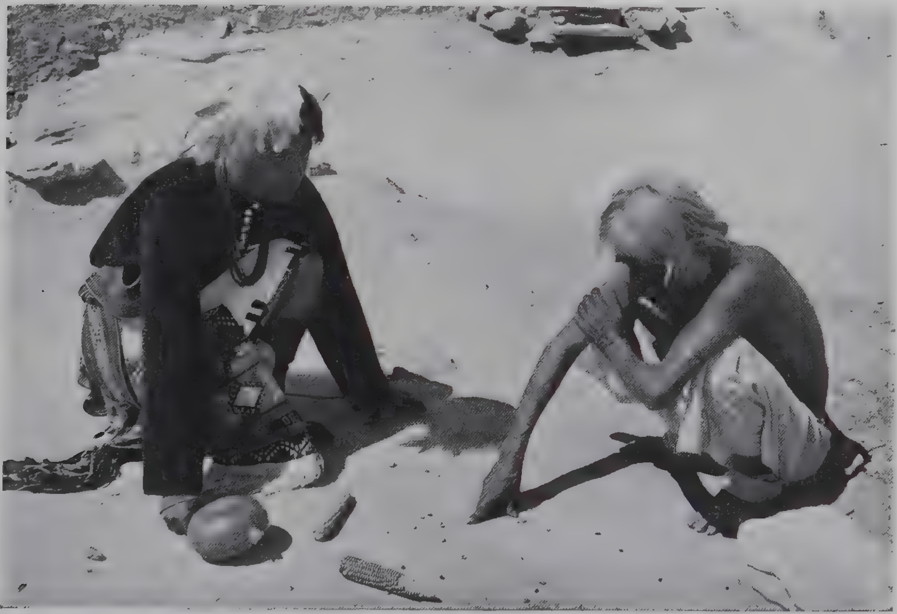


NORTH WALL OF THE PUEBLO BONITO AS SEEN FROM THE NORTHWEST: CHACO CANYON

The transverse wooden ties to be noted on the left form one of the puzzles of the ruin, for today no timber of this size is to be found within forty miles of the canyon. Large beams have been torn from the round holes at the top. Openings at the ground level have been cut by vandals.



HOPI GIRL OF WALPI (PLACE OF THE NOTCH)



A HOPI "UNIVERSITY" AT WALPI

Garfield's ideal of Mark Hopkins on one end of a log with himself on the other was anticipated by the American Indian, whose tribal leaders are teachers in such primitive but effective agricultural "universities" as this scene discloses.

TWO BEAUTIES OF THE ZUÑI

The Zuñi women are attractive Indian types when young; the Zuñi pottery still is made according to aboriginal methods and patterns. The latter is as distinctive for its coloring as is the exquisite ware of the Chaco Canyon for its black and white design.

with the addition of a curved wall binding the ends of the E projections and forming inner courts. The other ruin to be studied, Pueblo Bonito (bonito—beautiful), is a D-shaped building, with its curved wall 800 feet long.

Archeologically this ancient Island of Manhattan, surrounded by a sea of sand, may accurately be described as "a hundred miles from anywhere"; for it is 100 miles north to the cliff dwellings of the Mesa Verde, 100 miles south to the ancient Zuñi towns, and 100 miles west to the ancestral site of the Hopis.

A reconnaissance party dispatched last summer made a report which, when examined by The Society's research committee, bristled with such interesting scientific problems that authorization and appropriation were made for the expedition which begins its work this summer, under the leadership of Neil M. Judd, curator, American Archeology, U. S. National Museum.

Within an area less than half that of the District of Columbia there are eighteen enormous community houses having from 100 to 800 or more rooms. There also are other structure types, such as the three- to twelve-room dwellings, groups of "talus pueblos" under the wall of the canyon, in the immediate vicinity of the large buildings, and tiny cliff houses and storage cists under the canyon wall itself.

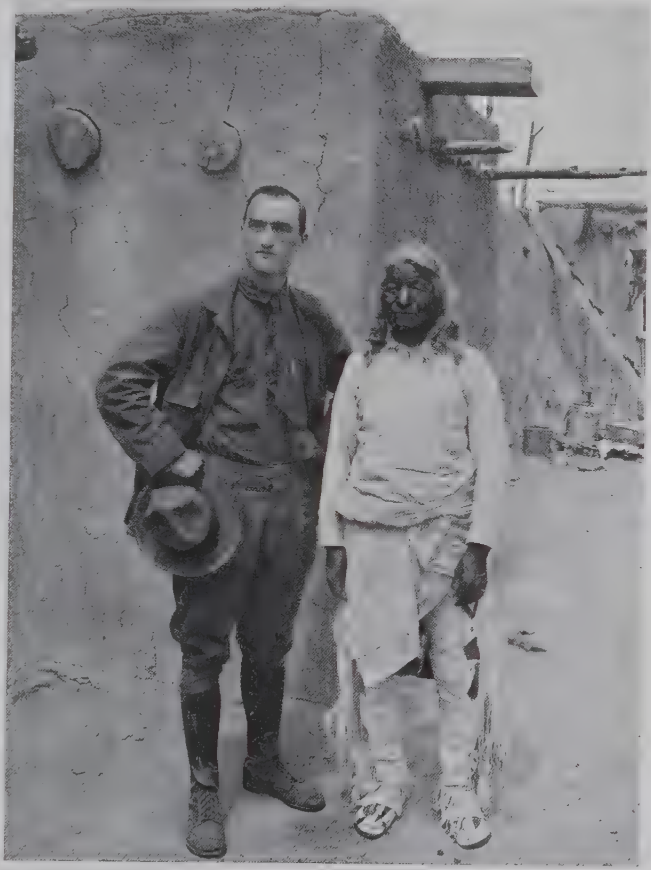
Then there are circular structures, adjacent to both large and small dwellings, and a semi-subterranean home built of mud instead of stone—the last mentioned found by The Geographic's reconnaissance party—which points to possibility of other ruins of greater antiquity that will be invaluable in tracing the development of this aboriginal civilization. The existence of these last mentioned in the Chaco Canyon region had not previously been suspected.

If the major groups were inhabited simultaneously, it is estimated the canyon population could not have been less than 10,000. This Indian city lay in a region so unfriendly that even the nomadic Navajo has not attempted to cultivate it. Hence the question, What has happened there? Did the climate change? Were the surrounding arid wastes once fields of cotton, corn, squash, and beans? Or did these aborigines of northwestern New Mexico have an irrigation system akin to that of the Ifugaos of the Philippines or the rice terraces of China?

Was the American Indian independent of any Nile, toward whose delta such an ingenious people as the Egyptians tended; and did he build apartments no less colossal and of more immediate service than the Egyptian "race of undertakers" constructed for their dead?

One fact is fairly certain, that this people of a period variously placed between the time of Julius Cæsar and William the Conqueror had a democratic form of government and elected a governor every year.

To the explorer, the Sherlock Holmes of ancient annals, equipped with pick and shovel, even a cursory inspection reveals clues that point to the recovery of buried treasure of history. For example, attention was attracted by masonry reinforced by timbers beneath the precipitous rocks that frown over the Pueblo Bonito. This represents a naïve effort to support a huge mass of solid rock weighing thousands of tons which threatened to topple on the great building beneath. This child-like engineering experiment was surprising, in view of the architectural skill disclosed in the construction of buildings which are superior in masonry to any other aboriginal structures in the United States.

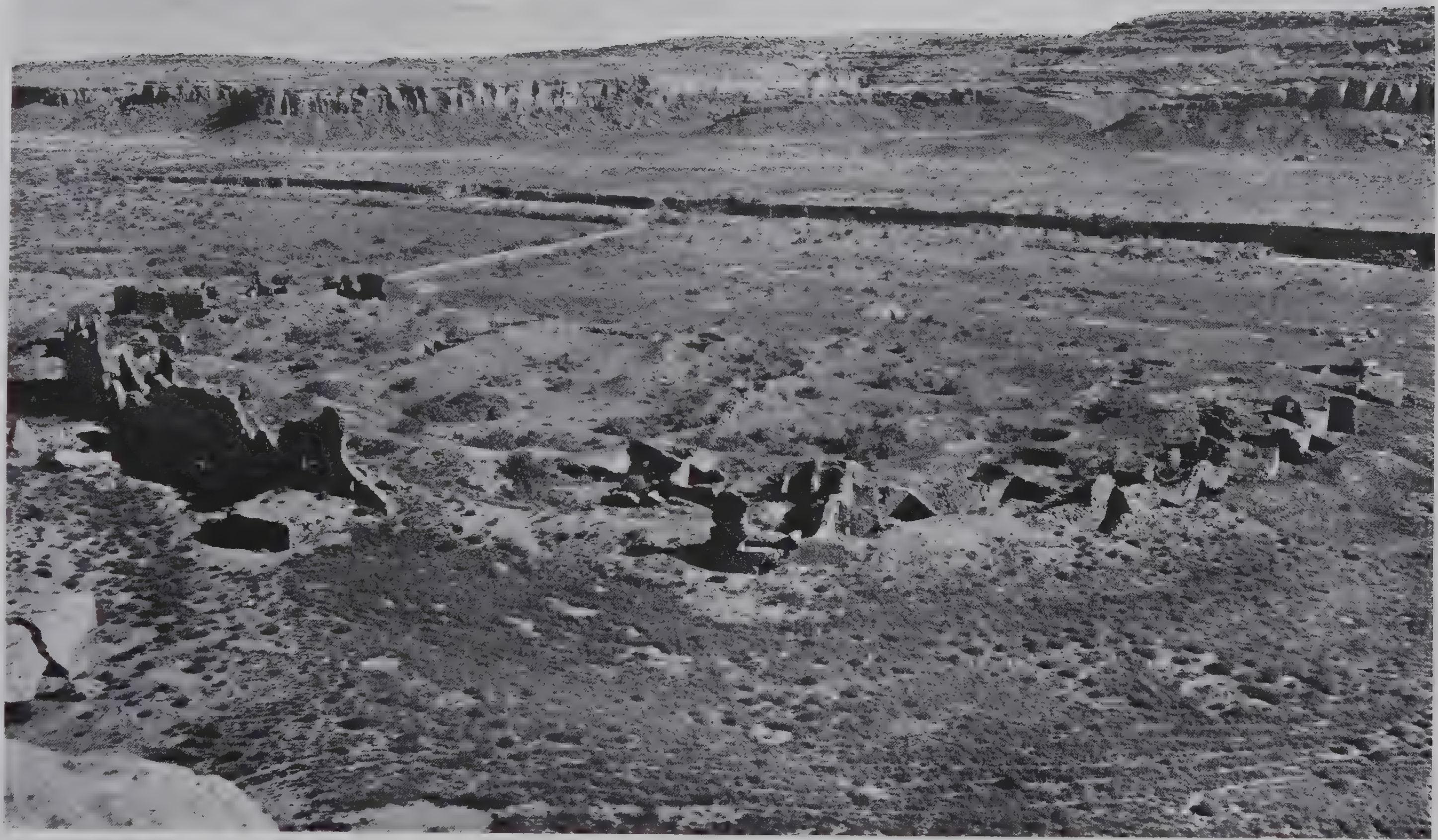


NEIL M. JUDD, LEADER OF THE NATIONAL GEOGRAPHIC SOCIETY EXPEDITION, AND SANTIAGO NARANJO, GOVERNOR OF A SANTA CLARA PUEBLO

Having been a member of numerous expeditions sent to study the natural wonders of the Southwest, Mr. Judd is admirably equipped by experience to undertake the work entrusted to him by the National Geographic Society. He was one of the members of the Utah Expedition, which, with a surveying party of the General Land Office, in 1909 discovered the Nonnezoshi, greatest of nature's stone bridges (see "The Great Natural Bridges of Utah," in THE GEOGRAPHIC for February, 1910).

The Society's reconnaissance party examined and reported upon the availability of 16 of the canyon's 18 major ruins. The Pueblo Bonito and the Pueblo del Arroyo were selected as promising the richest rewards. These two ruins lie in the very heart of the Chaco Canyon National Monument.

Pueblo Bonito has been called the fore-



PUEBLO BONITO AS SEEN FROM THE CLIFF OF CHACO CANYON, LOOKING TOWARD THE SOUTHEAST

Excavation will outline the structure more clearly and uncover, in addition, the rare treasures of exquisite jet and turquoise ornaments, utensils, and tools of the 1,000 or more aboriginal tenants of this mammoth D-shaped apartment-house, which had an acreage and height comparable to the United States Capitol, disregarding its dome.

most prehistoric ruin in the United States. It is the largest of the ruins, the most complex in design, the most impressive. It seems to tell most clearly the unwritten story of the forgotten people who once dwelt within its silent walls. It covers an area approximately that of the United States Capitol. Its 800 rooms probably sheltered from 1,000 to 1,200 souls.

These mysterious tenants tilled the soil of the broad, level canyon floor; they hunted deer and antelope on the mesas overlooking the valley; they probably waged war on the Navajo, the Philistines who pressed upon them from the north.

RUINS ARE DEPOSIT VAULTS OF CERAMIC TREASURES

Already ceramic remains of rare artistry have been taken from Pueblo Bonito, exquisite ornaments of jet and turquoise mosaic, tools and utensils of bone, stone, and wood. Tons of earth and stone have been removed in search of material. Yet the great ruin still guards priceless secrets. The architecture remains to be studied and further evidence of the pursuits of its people needs to be found and interpreted.

Less than a city block west of Pueblo Bonito is Pueblo del Arroyo, occupying a perilous position, as indicated by its name; for the wash, or arroyo, which passes the structure threatens to cut away the bank upon which the ruin is situated. The pueblo virtually is virgin soil for the investigator. It probably stood four stories high. The upper story is gone, the first is buried, leaving only the second and third exposed.

It possesses characteristics that make all the ruins noteworthy and one, in addition, of paramount importance. Beneath the pueblo, exposed only by the caving of the arroyo bank, is a dwelling of the "small-house" type noted above. It is considered that two periods of occupancy at one site, each with its distinctive remains, offers an unparalleled opportunity for study of culture sequence. So far as is known, this is the only instance in Chaco Canyon where such superposition occurs. The fortunate proximity of Pueblo del Arroyo and Pueblo Bonito affords one advantage to the expedition in a region where many handicaps must be overcome.

Geographically the Chaco Canyon ruins have a special interest. They denote admirably the exceptional characteristics that result from an exceptional environment. Being a people hemmed in by natural barriers, their area of activity was restricted.

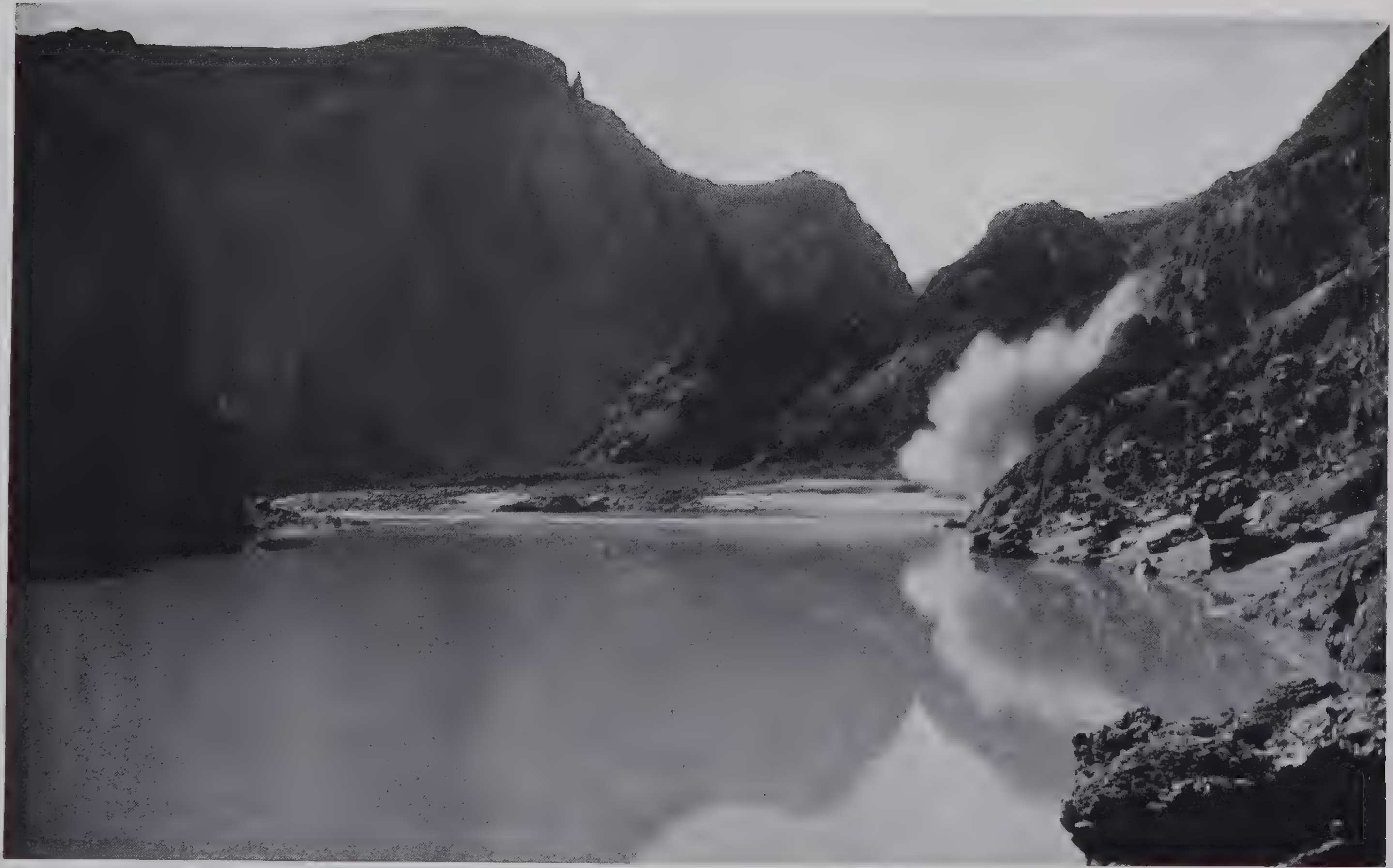
They were able to meet their material needs by expending only a fraction of their energy. Hence the surplus found expression in religious ritual, attested by the great ceremonial chambers; in architectural monuments, as did that of the European cathedral builders of the Middle Ages; and in ceramics, which flourished there as never before or since, for the black and white ware of the Chaco Canyon has been cited as marking the high point of this art in the Southwest.

Other departments of science may be expected to profit by results of the Chaco Canyon investigations. The excavations and repairs of the ruins, their architecture and masonry, fall under the head of archeology. What is learned of their builders, where they came from, how long they stayed in the canyon, and where they went are questions related to ethnology.

The Chaco Canyon is a desert today, unwatered except by floods in the rainy season. The geologist must be relied upon to describe conditions of water supply and crops when the great houses were occupied. Specialists in desert flora must coöperate with the geologists in an effort to picture the economic life of these ancients. Only by the combined findings of these various experts can it be determined whether the inhabitants left because natural changes threatened their food supply, or whether falling cliff masses impressed their superstitious minds as being omens of evil.

Being within the Chaco Canyon National Monument, the Pueblo Bonito and Pueblo del Arroyo ruins are reserved and protected for the American people. The National Geographic Society's investigations, made possible under a permit granted by the Secretary of the Interior, therefore constitute a gift to the public.

The excavations, at the expense of The Society, should solve many of the problems now apparent. Repairs will prevent rapid disintegration of the walls and insure longer life to the ruins.



Photograph by Kolb Brothers

BLASTING ROCK TO MAKE PLACE FOR THE FOUNDATION OF THE GRAND CANYON SUSPENSION BRIDGE

The completed canyon bridge will be 420 feet along the roadway and is suspended 60 feet above the river in normal flow, but only 13 feet above the rushing torrent when it is at its greatest flood. This is the only bridge across the Colorado above Needles, California, which is 360 miles by river course to the south.

THE GRAND CANYON BRIDGE

By Harriet Chalmers Adams

THE suspension bridge over the Colorado River in the Grand Canyon is practically completed. Late this summer it will be possible to ride from El Tovar, on the south rim of the stupendous chasm, to the Kaibab plateau, on the north rim.

The bridging of the Granite Gorge of the Colorado opens up a new wonderland in the Grand Canyon National Park. From the Kaibab plateau, which averages 1,000 feet above the better-known south rim of the canyon, new and amazing panoramas are presented.

Last month I rode down to the river over a trail not yet opened to tourists, messed with the bridge crew, and spent the night in the gorge. The bridge is 11 miles by trail from El Tovar and 4,700 feet below Yaki Point, on the Coconino plateau. The saddle trail, following the Bright Angel and Tonto trails to the river, and up Bright Angel Canyon to the Kaibab forest, is about 31 miles in length. Rim-to-rim travelers will spend the night in a camp near Ribbon Falls, about eight miles beyond the river.

It was a chilly morning when we started for the bridge camp. The wind surged through the pines and pinyons, and twisted the gnarled cypress trees overlooking the chasm. It is the Rim of the Eternal, to be approached with awe; but people differ.

I heard a stout woman, standing by the lookout, say to her daughter, "Oh! Clara, I'm terribly disappointed. We've come at a time of year when there's no water in the canyon!"

A tall man, with a red face, was explaining to a thin man in a plaid suit that, in contour, the canyon was exactly like the doughnuts his mother used to make.

SPRINGTIME ON THE TRAIL

Once down the trail it was springtime. Shimmering blue-jays chattered among the Douglas firs and emigrant butterflies zigzagged by. High in the cliff a canyon-wren piped up a love ditty.

The "expedition" consisted of the Chief Ranger of the Grand Canyon National Park, the wandering lady he escorted, and our two mules. The ranger, whose first love was the Yellowstone, has been many years in the park service and regards our national playgrounds with reverence. He is of the opinion that all those caught carving their names on rocks or trees should be lined up and shot at sunrise.

Down we dropped to the Tonto plateau, the green shelf on the canyon wall lying between the ruby-stained limestone and the gray Archean granite. Here winds a trail of romance.

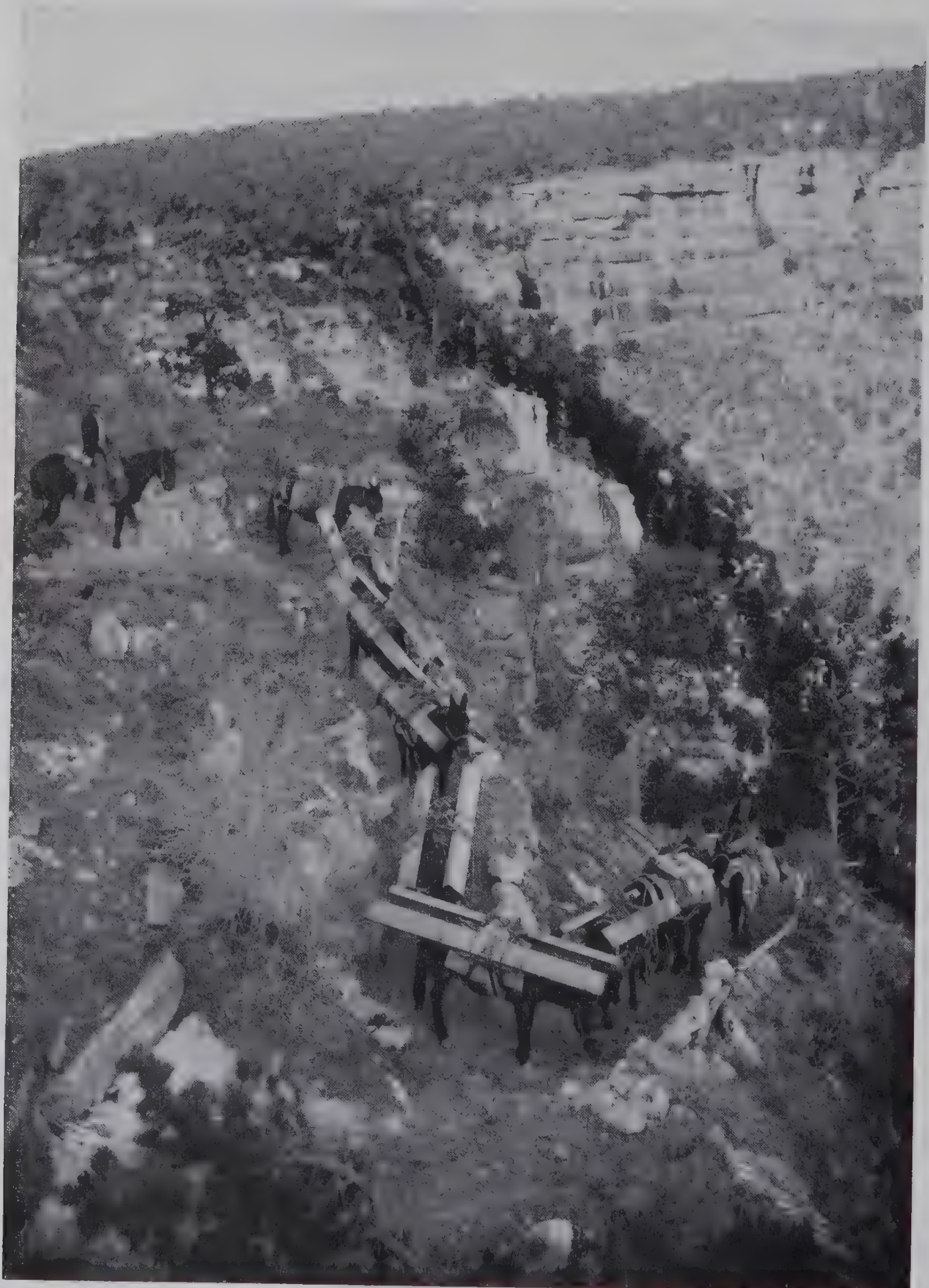
ONCE THE HIGHWAY OF THE CLIFF-DWELLERS

In the shadowy past this was the highway of the Cliff-dwellers. Here, in later years, Spaniards whose names are not written on the historic page adventured. There came occasional fur trappers from lands far to the north; the first of those great explorers who dared the descent of the river; hardy miners, whose half-hearted workings still border the Tonto trail.

We counted seven wild burros descended from pack animals abandoned by the miners. Deer were recently seen in this part of the canyon. Mountain-sheep hide on ledges high up the wall. Many other wild creatures still find refuge in this vast wilderness.

The only animals that we saw, besides the burros, were woodrats nearly as large as squirrels. These "trade rats" accumulate great mounds of rubbish. From a camp they walk off with the soap and the spoons, leaving pebbles and sticks in exchange.

The pack-train, carrying the bridge material from railroad to river, made its half-way camp at Pipe Creek. Here only a lonely black kitten greeted us. The pack-train was "on the job." It has been a tremendous undertaking to move the lumber, cement, and cables down the 11 miles of steep, winding trail to the bridge site. Many are the exciting tales told by the packers. On one trip a horse



Photograph by Kolb Brothers

PACK-TRAIN CARRYING LUMBER DOWN TO THE BRIDGE SITE

"It has been a tremendous undertaking to move the lumber, cement, and cables down the 11 miles of steep, winding trail to the bridge site."

Photograph by Kolb Brothers

THE PACK-TRAIN MAKING ITS TORTUOUS WAY TOWARD THE RIVER BED

In transporting the material from the rim of the Grand Canyon to the suspension bridge camp site many difficulties were encountered. On one occasion one of the pack-horses went over the cliff, carrying two other animals with it. Only the resourcefulness and daring of one of the men saved the remainder of the train by cutting the ropes.

went over the cliff, carrying two others with him; but a resourceful lad cut the rope and saved the remainder of the train.

Since January these pack-trains have been steadily trudging up and down between the hidden river and the railroad on the rim.

A REHEARSAL FOR CARRYING THE CABLES

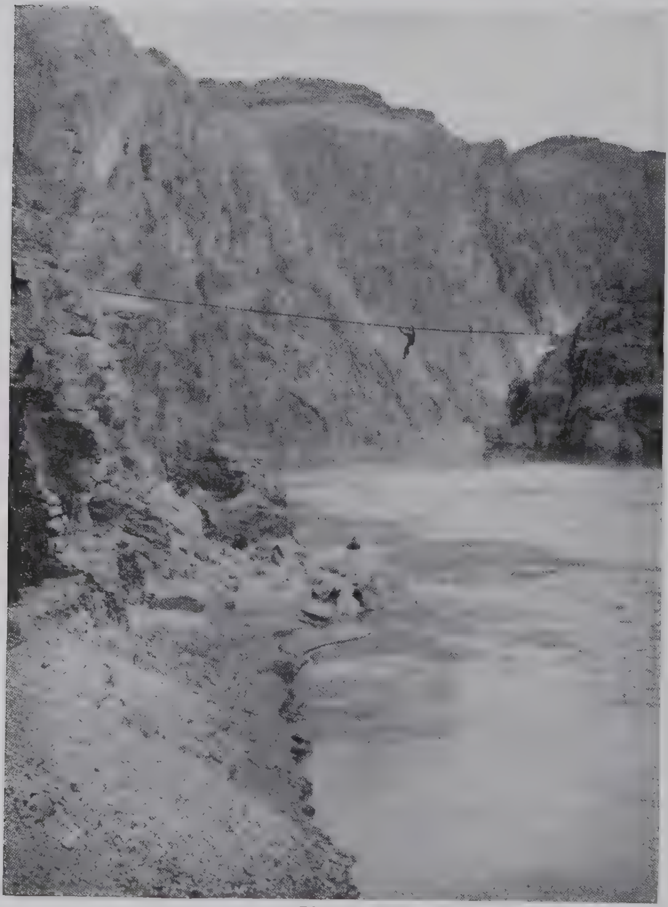
The transportation of the 1,200-pound cables alone marks an epoch in bridge-building. The superintendent of the Grand Canyon National Park, who supervises the bridge-work, is an engineer whose varied experience ranges from setting the official height of Mount McKinley, in Alaska, to locating a Patagonian railroad. He conceived the idea of "rehearsing" the carrying down of the cables by estimating, with ropes, just the proper length of line necessary between each mule, as the train swung around the curves. The 1,200-pound cable was then loaded on to eight mules roped together, with the weight evenly divided, a man walking at the head of each mule.

The sun was high in the heavens as we made the final drop down the newly cut trail in the granite wall to the bridge camp by the river. There were three sleeping tents in the camp, a dining-room tent, and a kitchen. The cook played star rôle. It is he who makes or breaks a camp. This particular cook put Broadway chefs to shame, in spite of the fact that everything but the water had to be packed down from above.

A 420-FOOT BRIDGE

I was fortunate in having the contractor himself explain the bridge to me.

The completed bridge will be 420 feet along the roadway, with a span of 500 feet from center to center of the bearings. The two main steel cables are placed about 10 feet apart and are anchored to the canyon walls 80 feet above the floor level, by means of sections of 80-pound railroad iron set into the rock with concrete.



Photograph from Harriet Chalmers Adams

SWINGING ACROSS THE COLORADO RIVER GORGE ON A WIRE CABLE

This method of crossing the canyon was employed during the work of constructing the suspension bridge.

Hanging galvanized steel cables, clamped to the main lines above, carry the wood floor of the bridge. A seven-foot wire meshing is strung along the sides as a protection for animals and pedestrians.

The bridge is 60 feet above the river in normal flow and 13 feet above the highest known water-mark in June floods. This is the only bridging of the Colorado above Needles, California, 360 miles to the south by river curve, as you "step it off" on the map.

Now for the bridge crew. Never have I seen a finer-looking lot of men—typical Americans, brawny and bronzed, not a pound overweight. One used to be a lumber cruiser in Alaska; another has mined in southern Chile; a third was a cowboy "before they fenced in the whole bloomin' Southwest." One is an amateur astronomer, who spends his evenings with his telescope under the stars. He says you can see the stars better from the depths of a canyon. Several go in for photography. One has a gift for whistling and can imitate the bird calls. There is a good bit of poetry and adventure nailed into the Grand Canyon bridge.

Night in the Granite Gorge of the Colorado! They gave me the tool and meat tent for an abode. I recalled a game we played in childhood, "Heavy, heavy, hangs over your head!" It turned out to be the bacon. The framework of my tent was formerly the iron cage in which the infrequent traveler crossed the river by cable. Colonel Roosevelt crossed in this way on his ride up to the Kaibab forest.

A DEEP, MASTERFUL, SULLEN RIVER

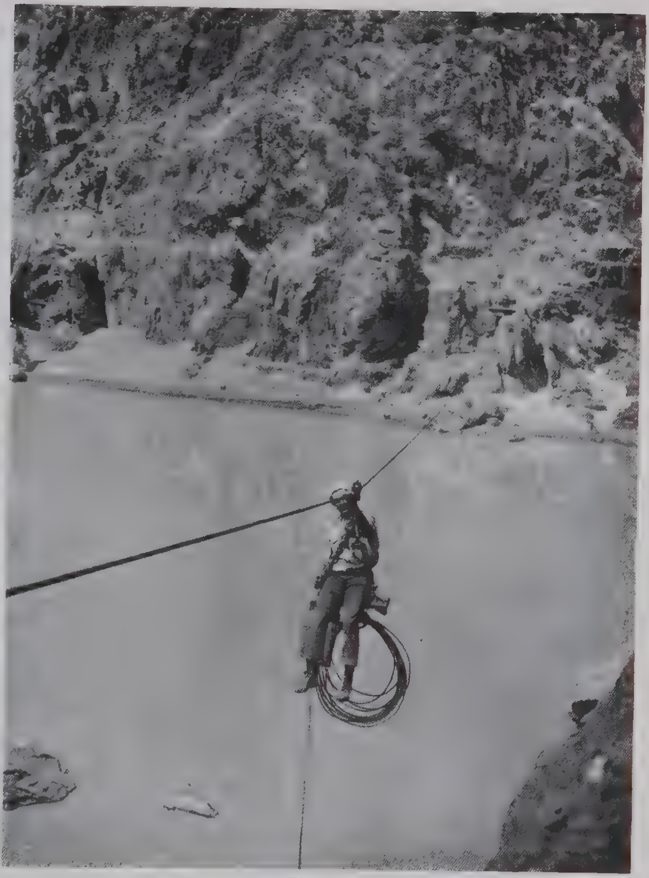
When the camp slept and moonlight flooded the gorge, I slipped out of my sleeping-bag and walked to the river. The Colorado is a deep, masterful stream, sullen, unfriendly. No habitations border its canyon shores. It has a flow of 20,000 cubic feet per second, reaching a maximum of 200,000 cubic feet. By day its walls take on a strange, reddish-purple glow, but by moonlight they were softly pink. A weird rock, which they call the Temple of Zoroaster, dominated the scene. Jupiter rode high in the heavens.

Across the river lay the ruins of an ancient Indian village, its broken stone walls strewn with prehistoric pottery—coils and Greek-key patterns—such as are found among the Mesa Verde cliff-dwellings (see illustration, page 652). Perhaps it was never a permanent settlement, only a temporary winter refuge of some peaceful plateau tribe driven down from the heights by the warring Utes. The early chroniclers of the canyon did not mention these Indians.

Who will write the long-ago romances and tragedies enacted within this mighty gorge?

A chill wind swept down the canyon and I crept back to my tent.

Next morning, when the 10 o'clock sun looked over the cliff, we crossed the river in a canvas boat, rowing well upstream and coming back with the current to the landing beach. The boat leaked. It is difficult to swim the river because of the heavy sand and silt; but in case of an upset one would probably be tossed up on the rocks before reaching the rapids.



Photograph from Harriet Chalmers Adams

THE FLYING-MACHINE, THE GRAND CANYON BRIDGE CREW CALLED IT

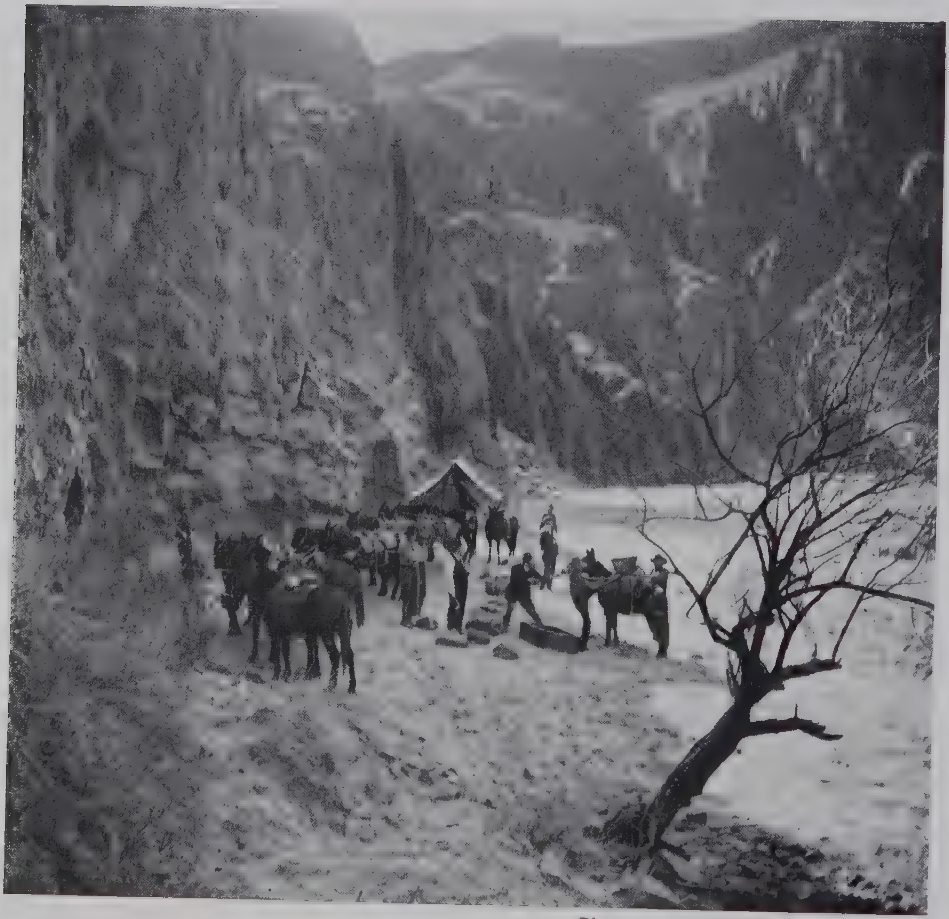
They went down by gravity and pulled up by hand on the other side.

LITTLE BRIGHT ANGEL, THE BRIDGE MASCOT

We climbed the bed of Bright Angel Creek, which here enters the Colorado, to the clump of cottonwoods still called "the Roosevelt camp." Here we discovered the bridge mascot, Little Bright Angel, a gray burro who lives in Elysian Fields, with clear water, plenty of grass, and a care-free life. We fed him pancakes sent by the cook, his favorite dish.

There are 113 crossings of the creek on the trail up Bright Angel Canyon to the north rim, and the little burro knows every one of them. Not long ago he guided the foreman of the bridge-crew up to the plateau, showing him just where to cross the stream.

I had heard that a distinguished American from Philadelphia, an enthusiast over the Grand Canyon, was to be the first to cross the Grand Canyon bridge; but the foreman told me, somewhat confidentially, that Little Bright Angel would be the first fellow across.



Photograph from Harriet Chalmers Adams

THE PACK-TRAIN ARRIVING AT THE BRIDGE CAMP, ON THE BANKS OF THE COLORADO

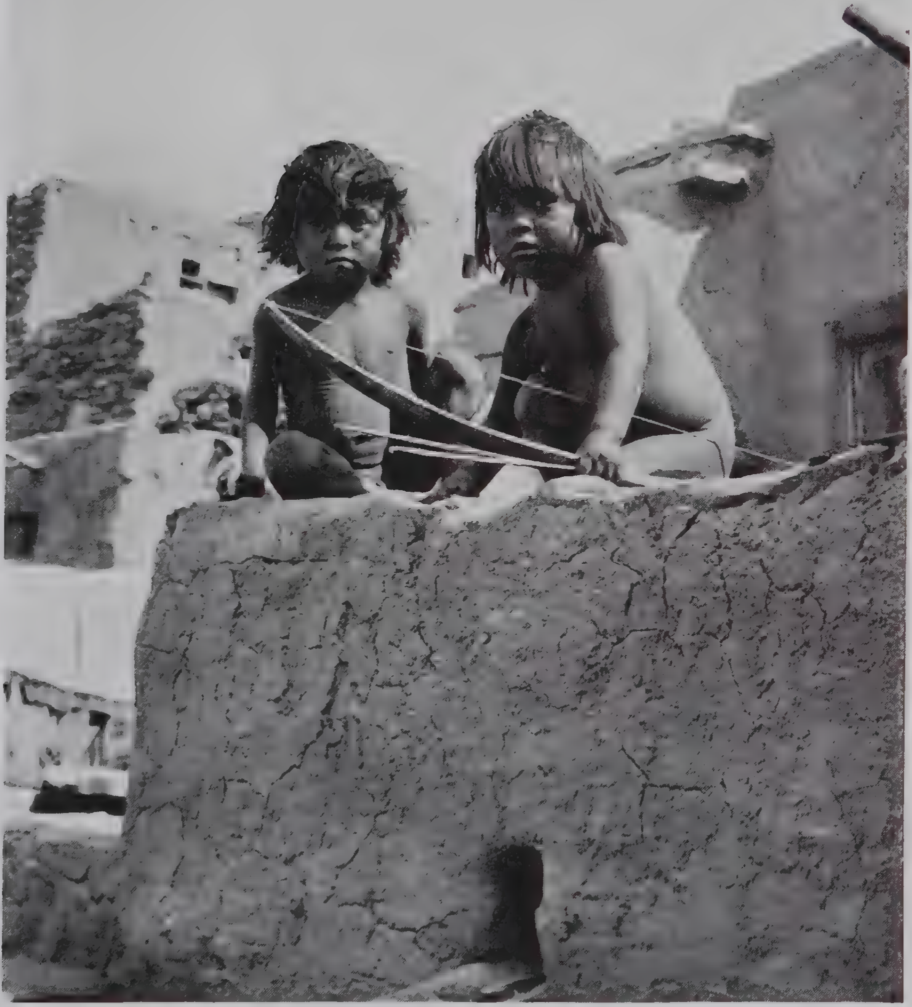
The camp consisted of five tents. Three were used as sleeping quarters for the bridge crew, one for a dining-room, and the fifth for a kitchen.

"You see," he explained, "Bright Angel has stood so long on the north shore of the river hoping to get across. He can't swim over, and he doesn't like the canvas boat."

Up in the Kaibab forest—"the island forest," a great naturalist has called it—live wild animals which have developed on original lines. The Kaibab squirrel and its cousin, the Albert, with their broad feathery tails, are the only American squirrels with conspicuous ear-tufts.

The herd of deer, variously estimated at from 12,000 to 15,000, are the mule deer, with large, broad ears and rounded, whitish tails, tipped with black. Where there are deer, there are pumas, or mountain-lions. They call them cougars in this part of the country. Uncle Jim Owens, an old-timer on the north rim, has hung out a sign: "Cougars killed to order." He has a record of 1,100 skins. His cabin walls are covered with them.

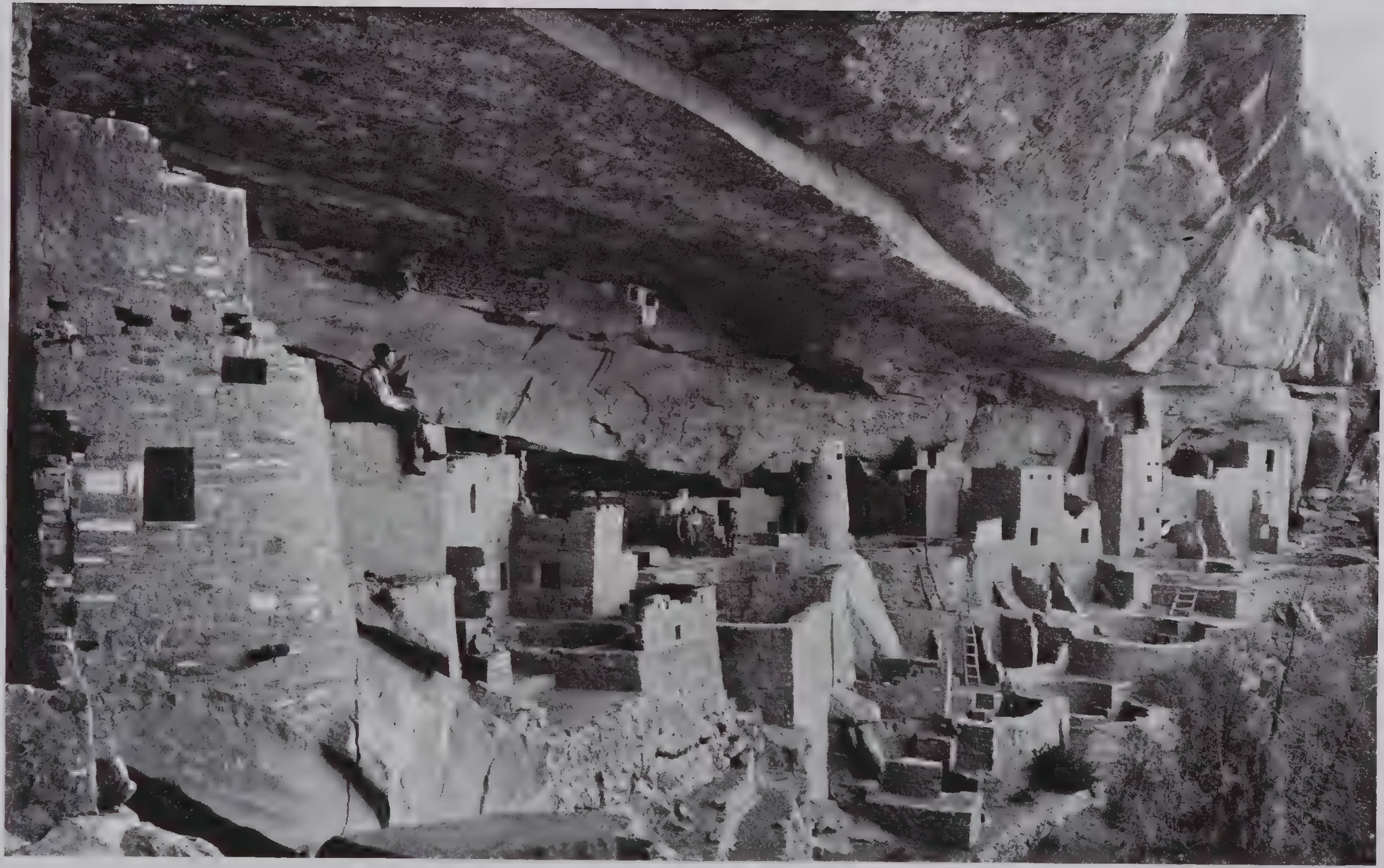
Other beasts of prey are the big gray timber-wolf, the coyote, and the fox. A man who lives here and explores unfrequented cliffs tells me there are antelope on the green shelf under the north rim. "Uncle Jim" has a promising buffalo herd, 64 in all. Isolated on a promontory and protected, the herd is sure to increase.



© Frederick I. Monsen

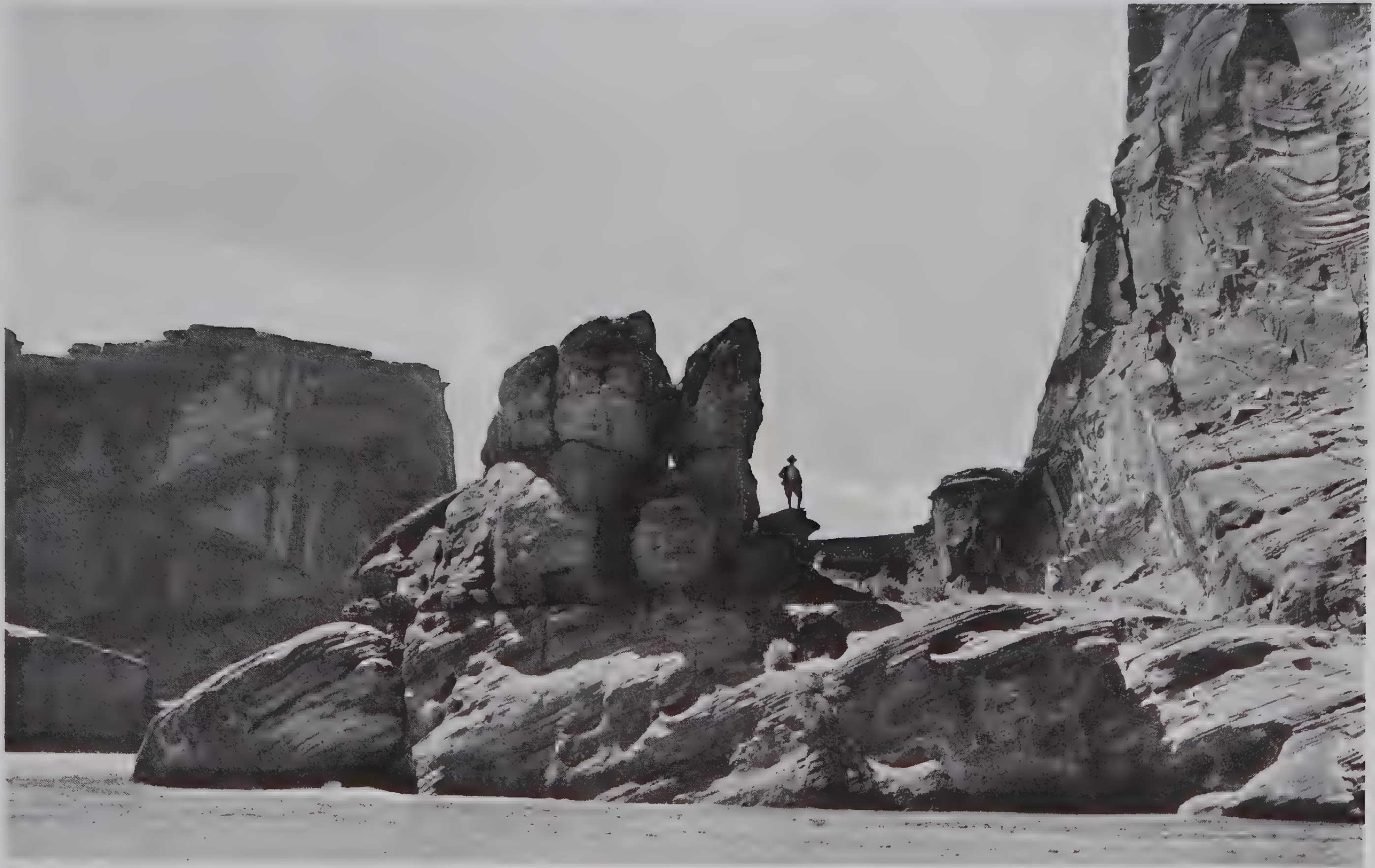
TINY "WARRIORS" OF THE "PEACEFUL PEOPLE": ARIZONA

These Hopi youngsters are "children of the sun" in a double sense. They are dedicated to that luminary deity by their parents, and are completely exposed to its penetrating desert rays until they are well in their 'teens. As their name signifies, the Hopi Indians are pacific; but they are far from being pacifists. Their "standing army" consists of a clan in which every mother raises her son to be a warrior, just as certain other clans are entrusted with the perpetuation of the Snake Dance and similar customs. The extinct Chaco Canyon pueblo people (see "A New National Geographic Society Expedition," pages 637 to 643) may have had an even more complex social organization, for they dwelt in apartment-houses compared to which many pueblo dwellings are but groups of cottages.



CLIFF PALACE: MESA VERDE

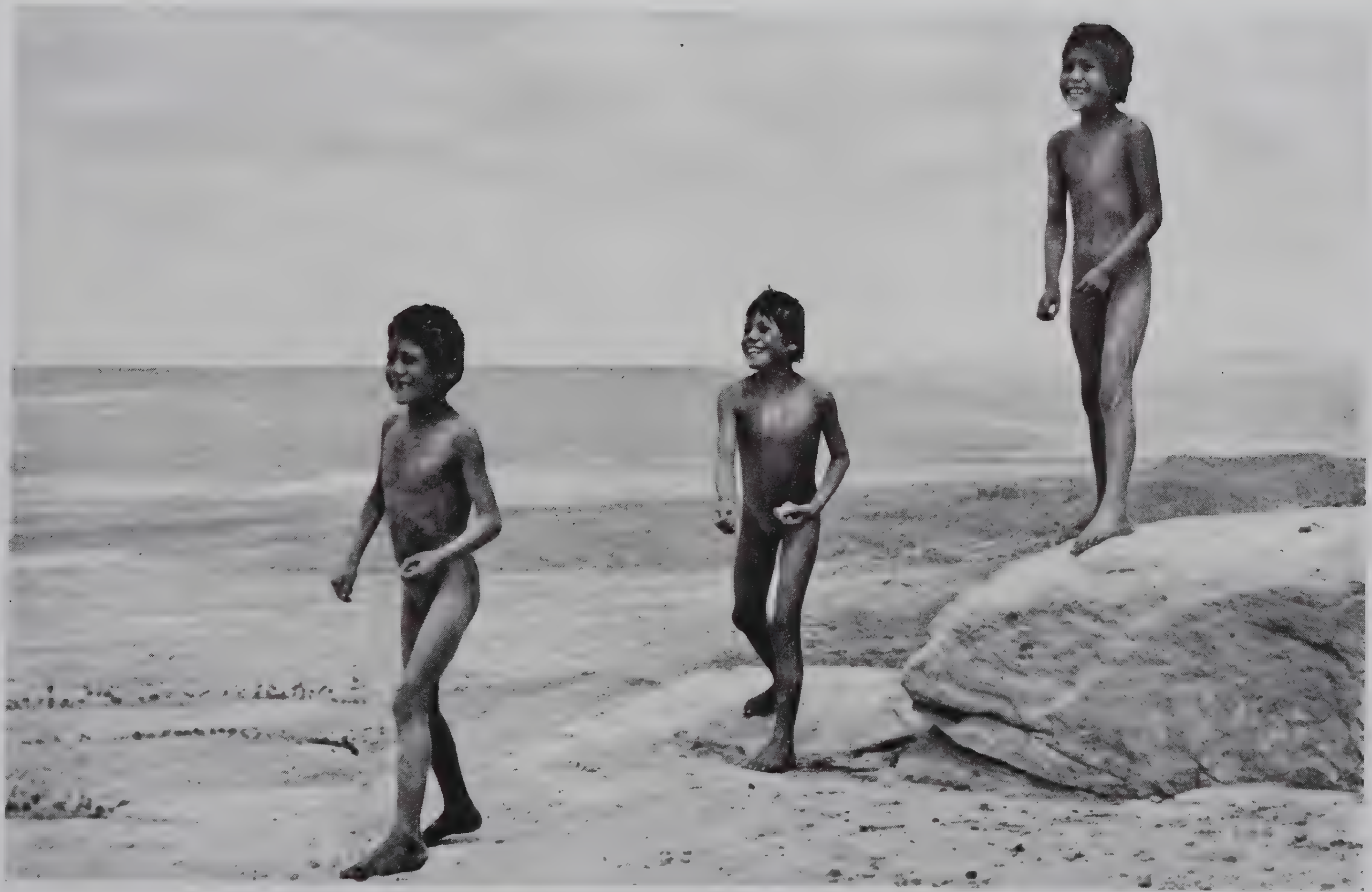
This most celebrated of Mesa Verde ruins is an example of a pueblo type in contrast to that of Bonito. The forgotten people of the Chaco found in canyon depths a refuge which the Mesa Verde dwellers utilized a cliff to attain. Recently a subterranean entrance was discovered to this "palace" of 200 rooms.



Photograph by Charles Martin

WHERE NATURE UPSET HER PAINT-POT: CANYON DE CHELLY

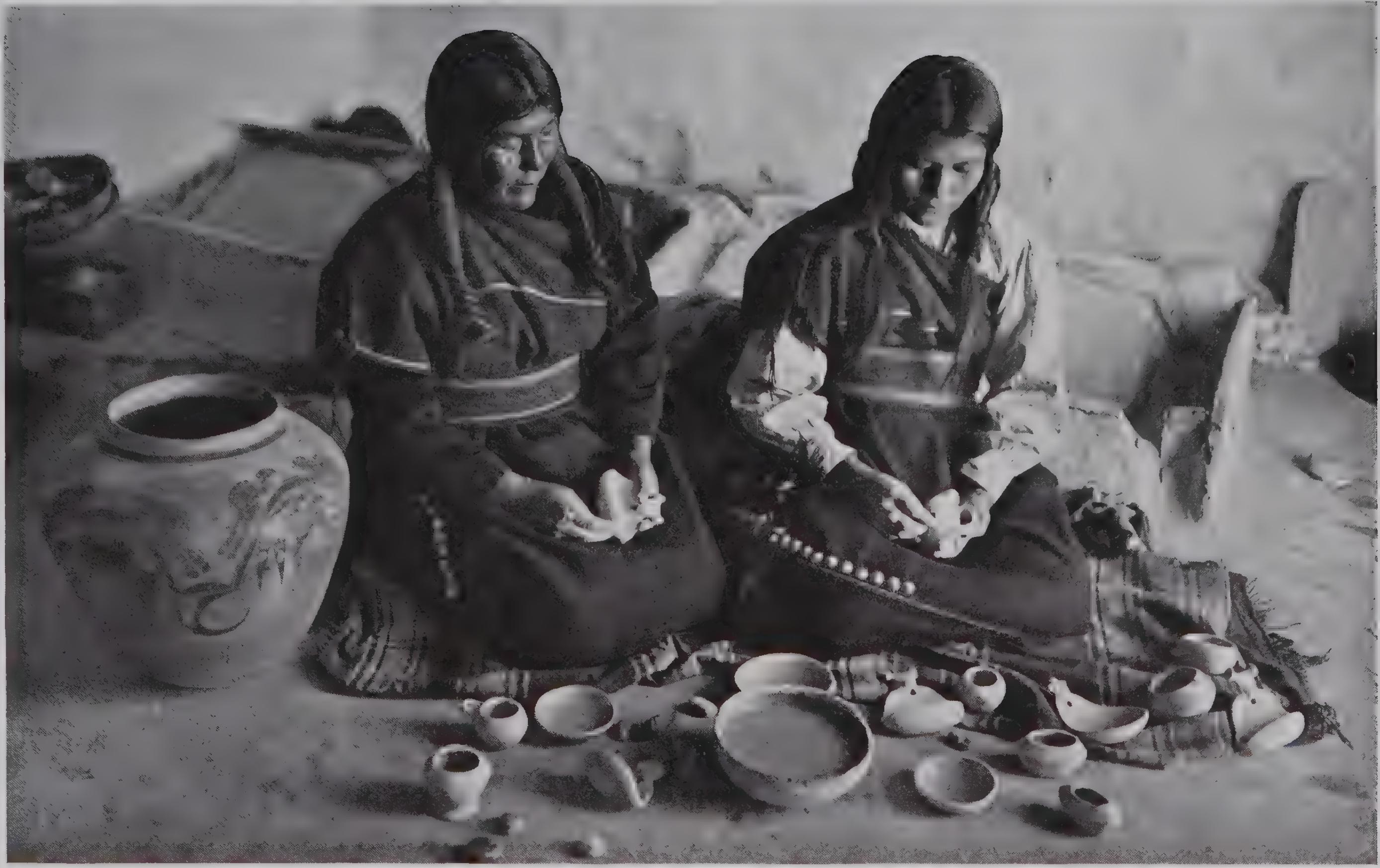
Bright red sandstone cliffs, piercing the sky to heights ranging between that of the Washington Monument and of the Eiffel Tower, sheltered a prehistoric people, probably of the same general period as those of Chaco Canyon. This most brilliantly colored of all the canyons of the Southwest lies in the heart of the Navajo Desert, northeastern New Mexico.



Photograph by Frederick I. Monsen

HOPI BOYS OF WALPI, ARIZONA

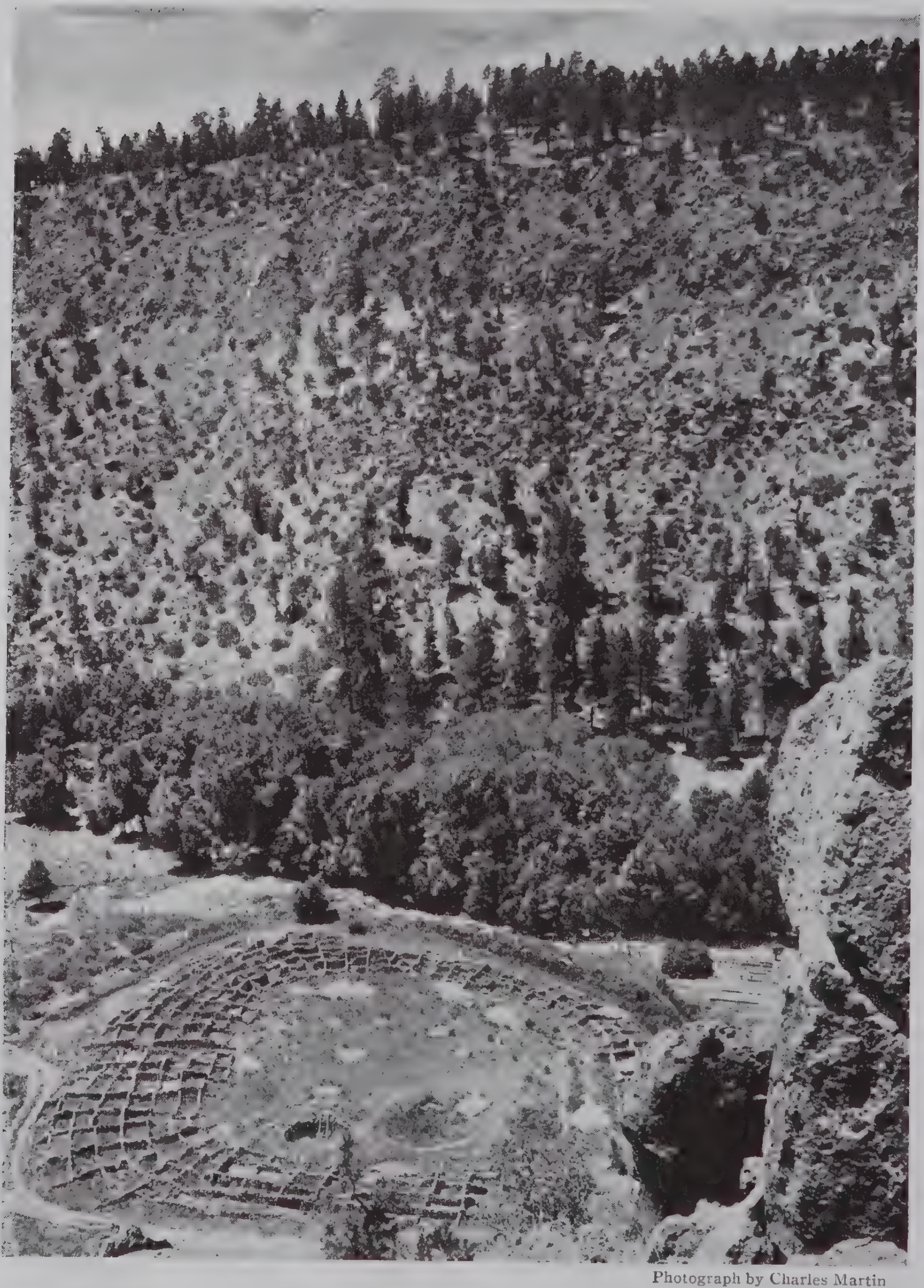
Walpi has a cliff-top location comparable to the monasteries of Meteora, Greece. Climbing along a steep trail, where ladders formerly had to be used at some stages, has developed a lithe, agile people. Hopi children are among the handsomest of the Pueblo Indians, though their symmetry sometimes is marred when their heads have been flattened by the cradle-board.



Photograph by Charles Martin

HOPI POTTERS OF ARIZONA ENGAGED IN AN ART THAT SURVIVES THE CENTURIES

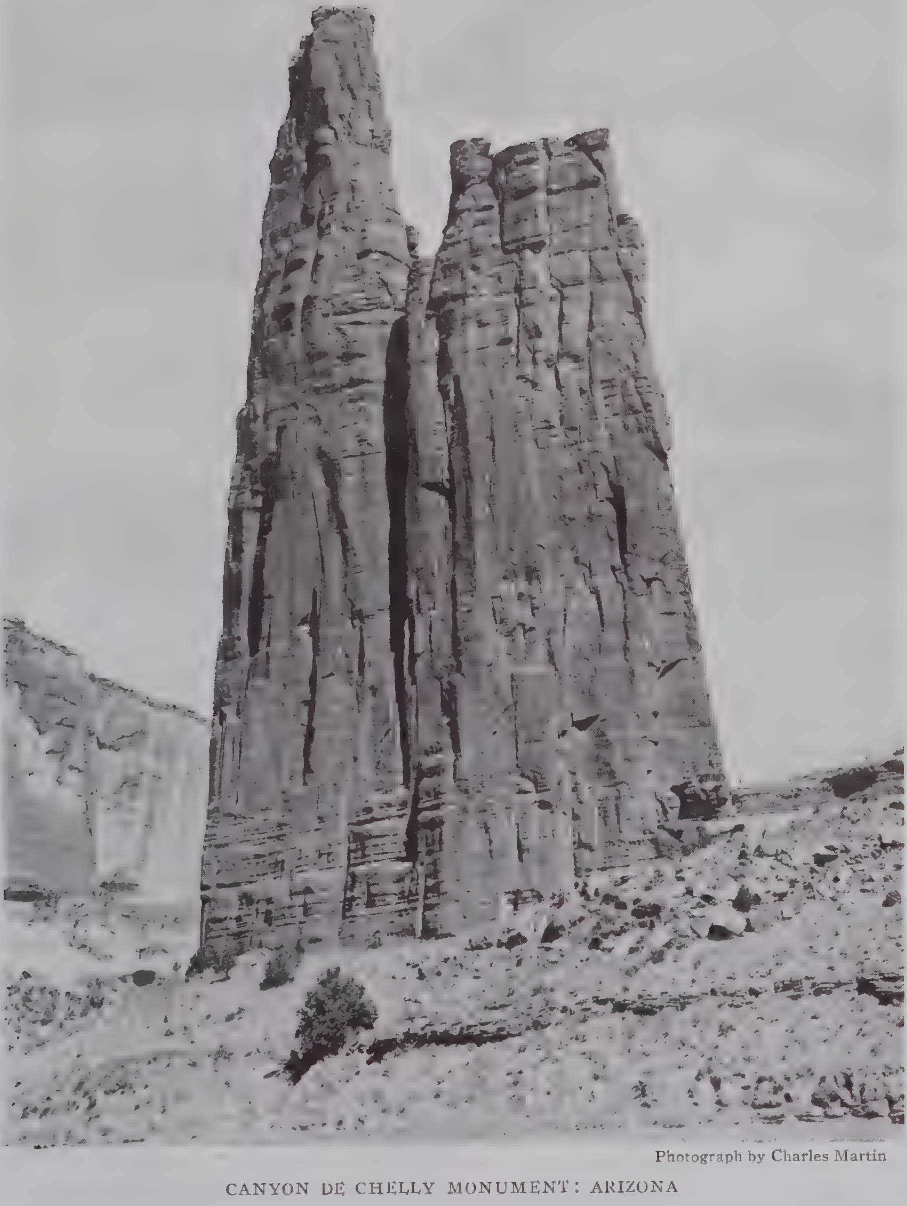
Compared with these Indian workers of 1921, Cape Cod fishermen are followers of an infant American industry. Ceramics have more than an esthetic significance. Pottery making, for example, is indicative of a pueblo people, for the ware is too fragile for nomad use.



Photograph by Charles Martin

EL RITO DE LES FRIJOLES (LITTLE CANYON OF THE BEANS): NEW MEXICO

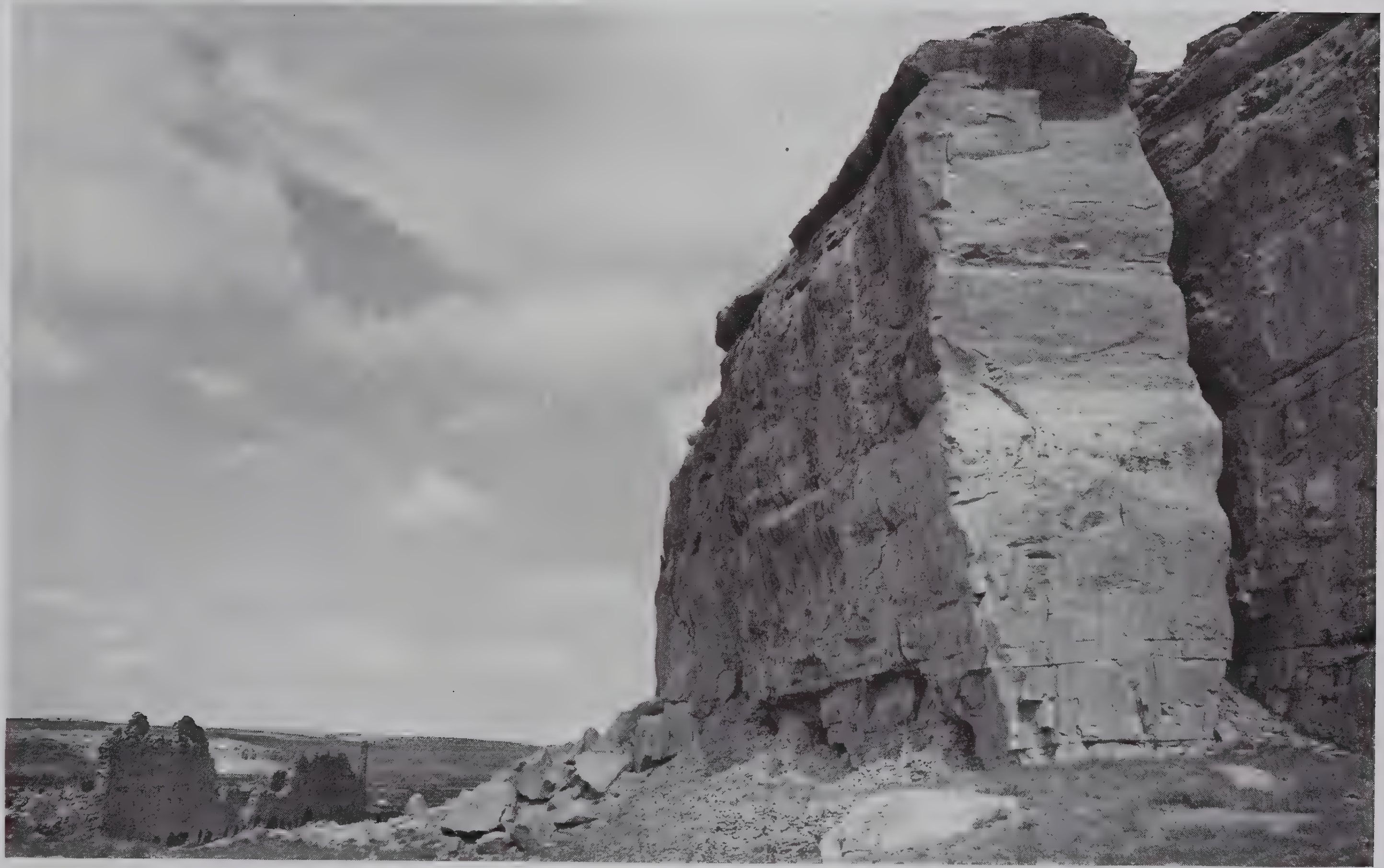
The honeycomb circlet in the foreground is the pueblo ruin of Tyuonyi. This photograph was taken from the top of a cliff along whose base for three miles stretches a series of "talus pueblos," a type of dwelling also found in Chaco Canyon (see text, page 640).



Photograph by Charles Martin

CANYON DE CHELLY MONUMENT: ARIZONA

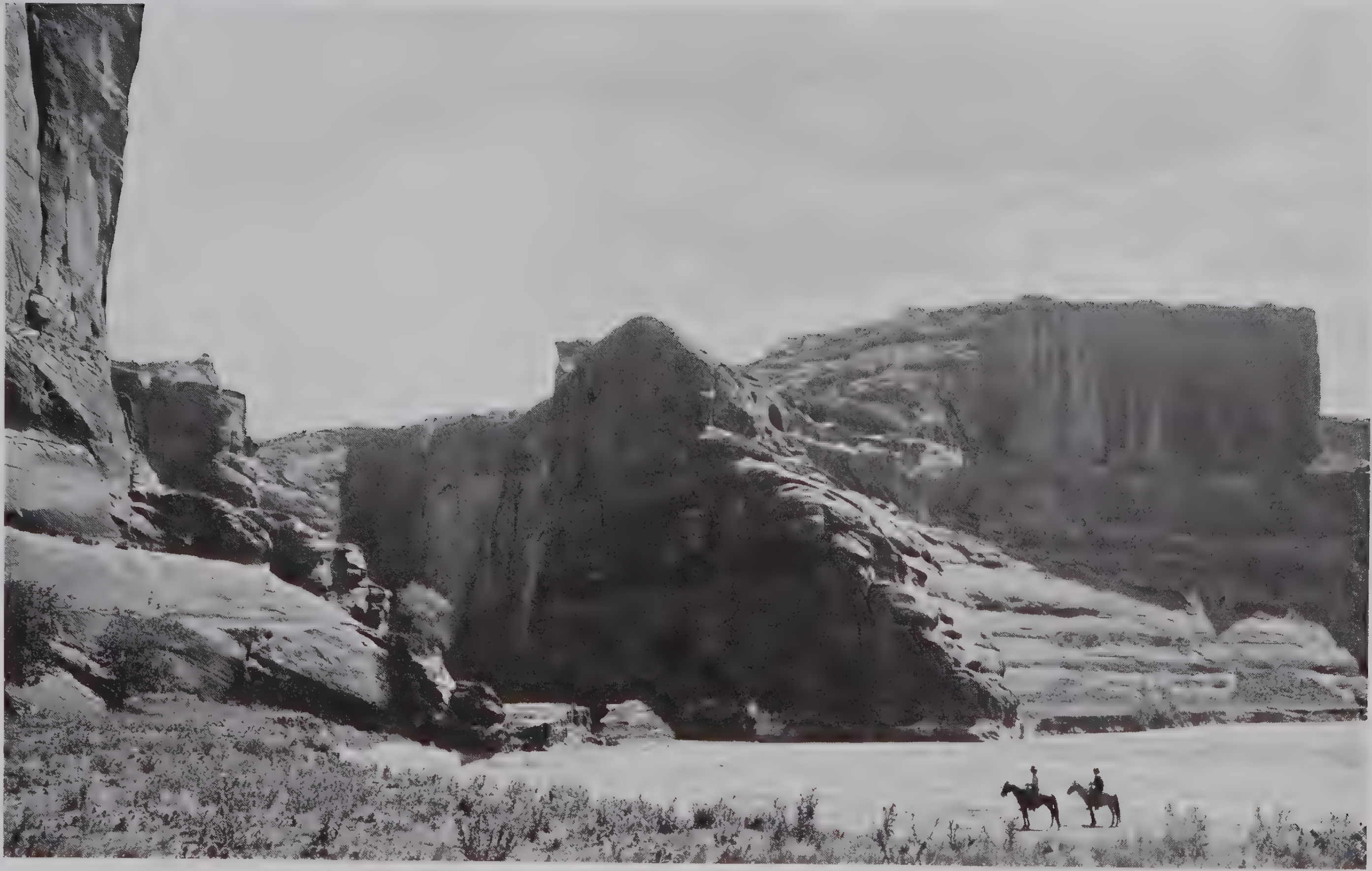
In the shadow at the base to the right a cliff dwelling was found. On a ledge just above is a man, whose form is a tiny speck against this lone sentinel among the fantastic "backdrops" of multihued canyon walls.



Photograph by Charles Martin

"BRACED-UP" CLIFF AT PUEBLO BONITO, CHACO CANYON

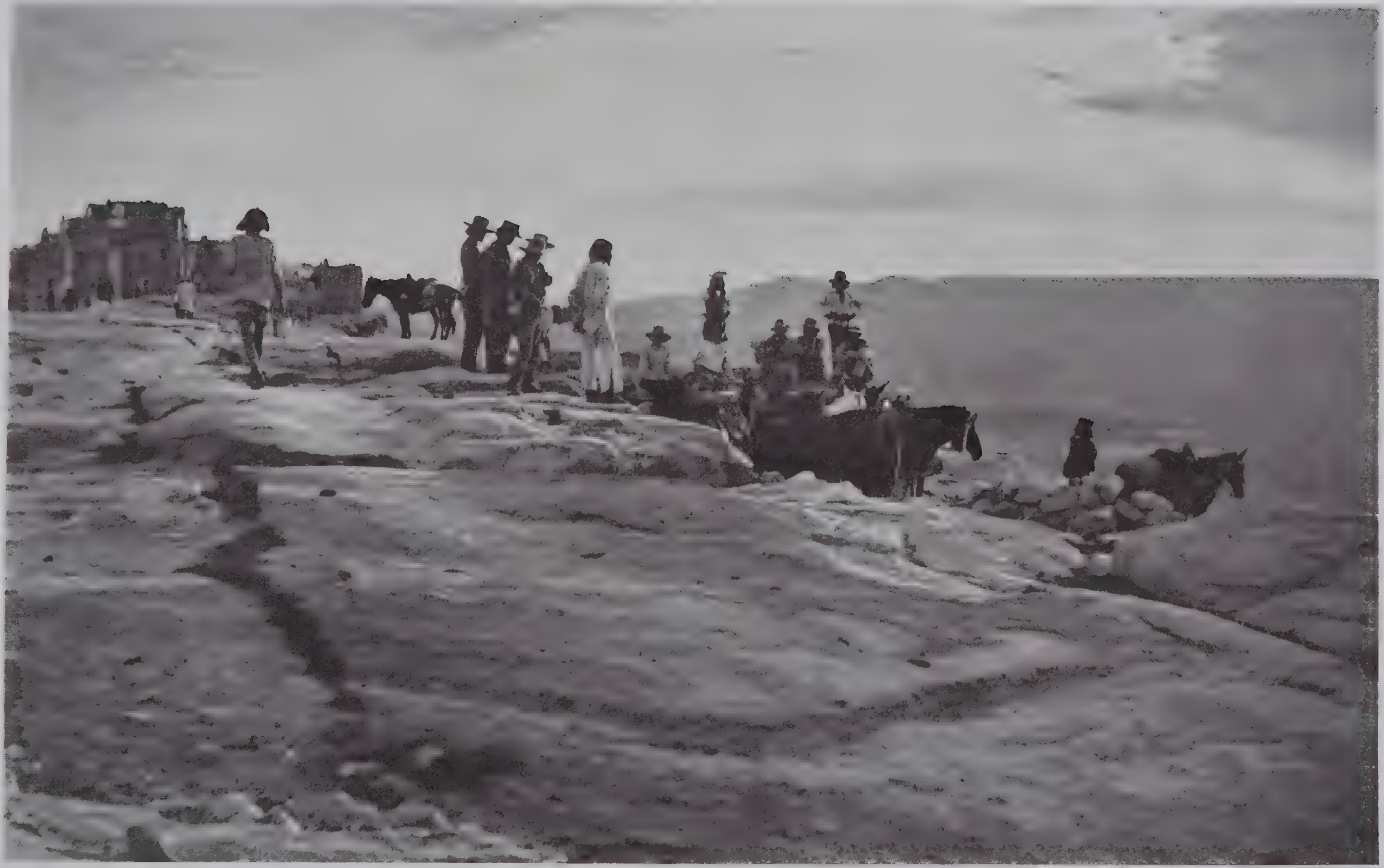
The scattered stones at the bottom of this leaning tower of Chaco are an enigma. They represent a naïve effort to prop up a massive cube of solid rock on the part of these aboriginal engineers, who exhibited contrasting skill and acumen in the construction of Pueblo Bonito, to the left (see also text, page 641).



Photograph by Charles Martin

CANYON DEL MUERTO, A BRANCH OF CANYON DE CHELLY: ARIZONA

Cliff dwellings abound on nearly every ledge. It is not strange that peoples living in such an environment should conceive man to have emerged from a vent in the earth's surface.



Photograph by Frederick I. Monsen

EVENING EFFECT: WALPI, ARIZONA

Like the people of San Marino, who climbed a mountain to live in liberty and serenity, the Hopi, self-styled "People of Peace," took refuge in the cliffs of northeastern Arizona to avoid constant warring with cruder tribes. Walpi is on the summit of a sheer cliff.

Photograph by Frederick I. Monsen

THE PAINTED DESERT: ARIZONA

Photograph by Charles Martin

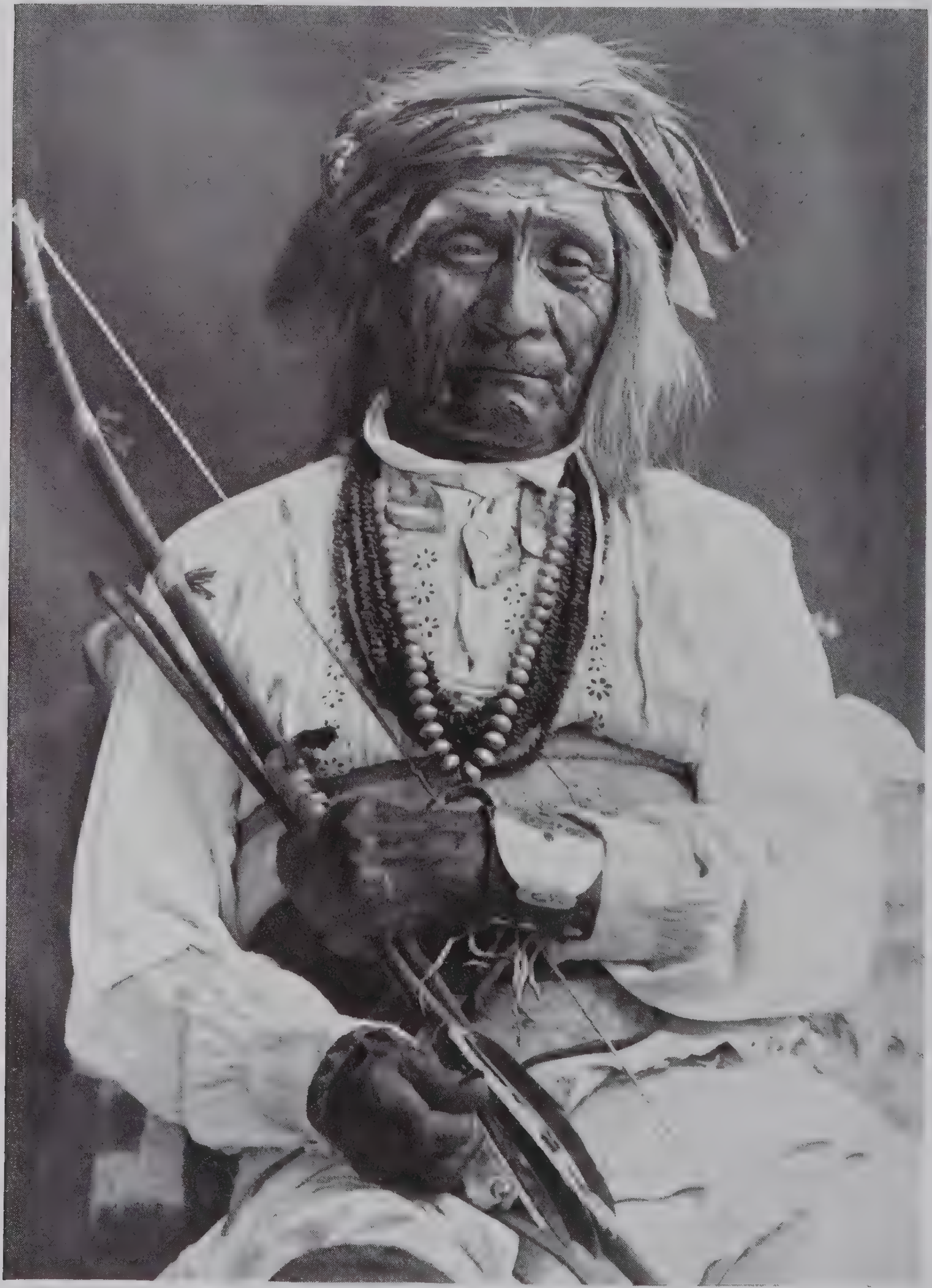
GIRL OF ORAIBI, THE METROPOLIS OF THE HOPI

Among the Hopi, famous for their snake dances, skill in weaving, dyeing and embroidery, and complex mythology, may be found lore which will provide clues to the Chaco Canyon people.

Photograph by Frederick I. Monsen

THREE LITTLE MAIDS AWAY FROM SCHOOL: HOPI INDIANS, ARIZONA

The white man is proud of his juvenile courts; the Hopi red man is proud that he has no need for such institutions. A Hopi father considers it an essential duty to teach his children to abhor lying and stealing, to respect and obey their elders, and to be self-supporting.



Photograph by Frederick I. Monsen

AN OLD WAR CAPTAIN OF LAGUNA PUEBLO, NEW MEXICO

The bow and arrow today are relics of bitter tribal wars of long ago. A more potent mace is a cane, prized by many council chiefs, who hold this symbol of prestige because of a visit to the "Great White Father" in Washington. Some of these canes have been handed down from patriarchs who made the cross-continent journey during Lincoln's administration.

VOL. XL, NO. 1 WASHINGTON JULY, 1921

THE NATIONAL GEOGRAPHIC MAGAZINE

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LIFE ON THE GRAND BANKS

An Account of the Sailor-Fishermen Who Harvest the Shoal Waters of North America's Eastern Coasts

By Frederick William Wallace

With Illustrations from Photographs by the Author

IT HAD been blowing a hard December gale for two days and the big liner was rolling and pitching enough to interfere with the comfort and equanimity of the thousand or more passengers aboard her. The few hardy ones who appeared at table bragged of their performance in lounge and smoking-room and opined it was quite a storm; the vast number of the prostrate vowed it was a hurricane.

In the lift of a squall of snow some one, peering through the great windows of the lounge, declared he saw a ship, a small schooner, close alongside. A rush was made for hats and wraps and the small party of those whom seasickness did not claim ventured out on the wind-and-spray-swept promenade deck to view the tiny craft which had the temerity to brave such winter weather so many miles offshore.

The writer happened to be coming home from Havre, and one glance at the schooner to windward served to recognize an old friend. She was a Bank fisherman, from Gloucester or Lunenburg possibly, and she was bound west for home, under heavy-weather canvas.

Passing within a cable's length of our rolling and wallowing leviathan, the little 100-ton schooner was storming along with a broil of white water shearing away from her sharp, round stem, and her reefed sails were as stiff and as white as marble, in the weight of the gale.

She would top a mighty Western Ocean gray-back with the graceful spring of a steeple-chaser, bowsprit pointing to the gray skies and red-painted underbody showing clean to the heel of the foremast; then with an easy plunge, like a porpoise diving, she leaped over the cresting surge and drove down into the trough with but the masts and upper parts of the sails showing above the bluey-green of the combers.

"She's a yacht," remarked some one admiringly.

"Pretty daring yachtsmen to be sailing in that little vessel so far out on the ocean," commented another.

WHAT THE SEAMAN MEANS BY "SAILOR"

"They're *sailors* aboard that craft," observed a business man to the grizzled chief officer, who had been cajoled from his watch below by the sight.

"Aye," he returned slowly, "they're sailors all right. She's an American fisherman homeward bound." And he stared at her for a minute or two, until she vanished in a flurry of snow.

In this age of steel hulls and steam and motor propulsion, the term "sailor" is often misapplied. All who are em-

Photograph from Phelps Studio

HOME FROM THE GRAND BANKS

The fishing industry along the North Atlantic seaboard is as old as the colonial history of the continent. The fisheries rights on the Grand Banks and along the shores of Nova Scotia and Newfoundland were the subject of diplomatic negotiations between the United States and Great Britain for more than a century and a quarter and were only finally settled by The Hague Tribunal in 1910.

Photograph from Phelps Studio

IN THE HARBOR AT GLOUCESTER

Within a few years after the landing of the Pilgrim Fathers, Gloucester had become the pioneer fishing port of the New World and a "nursery" for stalwart seamen of the American Navy—the men whose descendants were to make history under such leaders as John Paul Jones, Perry, Lawrence, Bainbridge, and Decatur.

Photograph by Herbert B. Turner

FISHING CRAFT AT GLOUCESTER

At the beginning of the Revolutionary War, Gloucester was second only to Marblehead as a fishing port. The industry suffered a blow during that period from which it did not fully revive until the Civil War.

ployed at sea on board a ship are called "sailors" by landsmen, but seamen narrow the embrace of the term down to those who can steer, equip, repair, and handle the canvas of a sailing craft under sea conditions. All others are deck-hands and seamen.

Sailors of the orthodox class even go a step further and designate all the personnel of a steamer as "steamboat-men." They consider the terms "seamen" and "sailor" to be sacred to ships driven by wind and canvas.

It has been my privilege to sail and steam the oceans in many kinds of craft, ranging from the romantic full-rigged clipper ship to the oil-burning greyhounds of twenty-knot speed, and from the graceful, sea-kindly Grand Bank fishing schooner to the sturdy steam-trawler of North Sea type; but in all my voyaging I am inclined to the belief that the only real "sailors" we have today, in this mechanical age, are to be found in the Bank fishermen of North America's Atlantic coasts.

The sailors I refer to are the crews of the beautiful fishing schooners that sail out of the fishing ports of Newfoundland, the Maritime Provinces of Canada, and the New England States of America; and the ports which claim most of them are Lunenburg, in Nova Scotia, and Gloucester and Boston, in Massachusetts.

These deep-sea fishermen are a distinctive type peculiar to the North American Atlantic coast. Racially they are from the sturdy pioneer breeds of Highland Scotch, Hanoverian German, West Country English, and West Irish which settled in Newfoundland, eastern Canada, Maine, and Massachusetts when America was young. Landing on the shores of the new land, they made their homes above tide-water and farmed, cut timber, and fished. To reach their markets they had to use the sea, and they built their own vessels to transport their goods.

The succeeding generations of men were, therefore, farmers, fishermen, woodworkers, and sailors.

Photograph by Herbert B. Turner

ALONGSIDE THE GLOUCESTER DOCKS

During the first half of the nineteenth century, the heyday of the American sailing marine, Gloucester, Portland, Boston, Provincetown, New Bedford, and Nantucket were the great fishing and whaling ports of the United States.

In the New England States this type succumbed to the development of other industries. Its representatives deserted the seaside farms and went west or into the cities, where life was less arduous.

Nowadays, the men who built and sailed the American sailing marine of 1800 to 1862; who made of Gloucester, Boston, Portland, Provincetown, New Bedford, and Nantucket the great fishing and whaling ports of America having disappeared, their places have been filled by those of their breed who have succeeded in resisting the allurements of the shore industries and the cities.

These latter are the Nova Scotians and Newfoundlanders, and they form the greater part of the crews of the Bank fishermen, with a sprinkling of Scandinavians, Portuguese, and native-born Americans. Thus it is that when a Gloucester fishing schooner is lost, mothers and widows in Newfoundland and Nova Scotia remain to mourn the majority of the vessel's dead.

THE SEA IS BEFORE HIS EYES FROM INFANCY

Physically, your American deep-sea fishermen are strong-muscled and able to endure hardship. They are not slum or city products, but are mainly raised in sea-coast villages of the Canadian provinces and Newfoundland.

At an early age they learn to handle an axe, to work on the land, and to rig and bait fishing gear. In the summer months the boys usually go shore-fishing or lobster-trapping. The sea is before their eyes from infancy; the roar of it in their ears and the smell of it in their nostrils.

Clean air, good, wholesome food, and hard work create a sturdy, hard-muscled youth who usually breaks away to sea in a Bank fishing vessel ere town lads are through grammar school. When he knows enough to "hold his end up" in a dory and aboard a fishing schooner, he makes for Boston and Gloucester, attracted by the good money made in Amer-

"ALL HANDS TO THE MAIN-SHEET"

The fishermen practically live in oilskins and rubber boots while at sea.

SAILS SPREAD FOR A RUN TO THE GRAND BANKS

ican vessels and the broader allurements of shore recreations in large ports.

Some few marry and settle down in American fishing ports, but the majority keep in touch with their birthplaces and journey home once or twice a year.

BOTH FARMER AND FISHERMAN ARE WEATHER GAMBLERS

Ashore, the Bank fisherman is not conspicuous. He talks, acts, and speaks pretty much as any other class of American worker. He is neither ignorant nor uneducated, nor does he interlard his speech with nauticalisms or wear his sea-boots and oil-skins when strolling uptown. The average deep-sea fisherman of today is merely a healthy, level-headed, intelligent class of skilled worker who regards his particular vocation pretty much as the farmer does his, and the two are much akin. Both are gamblers, with livelihoods dependent upon the weather.

But it is at sea that the Bank fisherman manifests his distinctiveness, and the splendid inherited qualities of the type are seen to advantage—daring, initiative, skill in seamanship, and ability to endure long hours of heavy labor and the rigors of seafaring in small vessels during the varying conditions of weather on the North Atlantic.

It may be said that he is no different from the European fisherman in this respect; but comparisons will show considerable differences. The deep-sea fisherman of Europe has practically outgrown sail, and works on powerful steam-trawlers, where ability to run a winch, haul and heave a trawl-net, use a netting needle, and dress and box fish are practically all that is required of him. On the few sailing smacks operating nowadays in European waters the trawl-net is also used as well as hook and line and drift-net. All the work is done on board the vessel.

DORY FISHING MAKES THE AMERICAN DISTINCTIVE

In the North American fisheries the fast-sailing and sea-worthy schooner still remains as the prime means of producing fish from the Western Atlantic "banks," and the greater part of the fishing is done from small boats, known as dories, which are carried by the schooner and launched upon the fishing grounds.

It is this dory fishing which makes the American fisherman, and by that term I include Canadian and Newfoundlander, a

SPEEDING FOR MARKET: A BANKER IN WINTER RIG

"The modern Bank fishing-schooners are undoubtedly the handsomest commercial sailing craft afloat. They are built of wood and range from 100 to 150 feet in length, with a tonnage of from 80 to 175 tons."

distinct type from his colleagues in other countries, and adds to his vocation a hazard and labor which calls for certain sterling qualities to surmount.

It is a peculiar fact that the North American fisherman, of all white fishermen, has stood out longest against modern innovations in fishing methods and equipment. In Europe, years ago sailing smacks and hook and line were discarded for the steam-trawler and drifter. The trawler of steel construction, propelled by steam or motor, has only been used in the American fisheries of late years, and at present there are about sixty of these craft on this side compared to the thousands in Europe.

But while backward in changing over to steel and steam, our fishermen have evolved a type of sailing schooner which is the last word in weatherly qualities and speed under sail, and the men who man these vessels are the only real sailors left in this age of steam.

THREE KINDS OF BANK FISHERIES

There are three distinct fisheries in which the schooner fleets of the Western North Atlantic are employed, namely, fresh fishing, salt fishing, and halibut fishing. Mackerel seining also employs a schooner fleet during the season, but this is not a Bank fishery in the accepted sense of the term.

A BANKS FISHING-SCHOONER

In European waters fleets of steam trawlers supply the fish markets, but in the North American fisheries the fast-sailing, seaworthy schooner is still mistress of the Grand Banks.

As most people know, the Banks are vast areas of shoal water lying at various distances off the eastern coasts of the United States and Canada and south and east of Newfoundland. Upon these Banks, in depths ranging from 15 to 200 fathoms, tremendous numbers of certain demersal species of fish are to be found at various seasons. Cod is the commonest variety caught; haddock ranks second, while hake, pollock, cusk, halibut, skate, whiting, catfish, wolf-fish, monkfish, and lumpfish are also marketed.

FISHING WITH A LINE NEARLY HALF A MILE LONG

In the offshore fisheries upon the Banks, none of these fish are caught by net unless by steam trawling. In the schooner fishery the long-line, misnamed "trawl" by fishermen, and hand-line are used exclusively.

The long-line is, as its name implies, a long line, ranging from 2,100 to 2,400 feet in length, and is made of thin, but incredibly strong, tarred cotton.

Into this "back line," or "ground line," are spliced thinner lines, called "snoods" or "gangens," at thirty- to forty-inch intervals. These snoods are usually from twenty to thirty inches long, and a strong steel hook is bent to each. Thus, on each long-line there are from 600 to 800 snoods and hooks.

Each long-line is coiled down in a wooden tub—often made by the fishermen themselves by cutting down a flour barrel—and every hook has to be baited before the "gear" is set.

In halibut fishing a much heavier line and hook are used, and as the snoods are spliced or bent into the ground-line at lengthier intervals, there is consequently a lesser number of hooks affixed to a coil of halibut gear.

THE ACTUAL FISHING IS FROM THE DORIES

Halibut line is not coiled down in tubs, but secured, when not in use, by a small square of canvas from which four pieces of short rope depend. The coil is placed upon the canvas and the ropes are used to lash the gear up in a compact bundle, the whole being called by fishermen "a

SIXTEEN KNOTS IN A DECEMBER BLOW

The photograph was taken from the bowsprit of an American fishing-schooner a few moments before it became imperative to reduce sail.

skate of halibut gear" in contradistinction to "a *tub* of cod or haddock trawl."

On every Bank fishing-schooner, except hand-liners, on which the fishing is done from the deck, a number of flat-bottomed, high-sided boats, called "dories," are carried. These dories are from 18 to 22 feet over all and their thwarts are removable, so as to permit their being "nested" one within the other upon the schooner's decks when not in use. From six to twelve of these dories are carried by fishing schooners, and it is from the dory that the actual fishing is done.

The modern Bank fishing-schooners are undoubtedly the handsomest commercial sailing craft afloat. They are built of wood and range from 100 to 150 feet in length, with a tonnage of from 80 to 175 tons. Their lines are fine and designed for speed, but weatherliness has been so well combined in the model that neither quality has been sacrificed. True, they are terrible craft for jumping about in a breeze and sea, but they seldom ship any heavy water on deck during a blow, unless "knocked down" or "tripped up" by squall or irregular wave.

Well-ballasted and drawing a lot of water aft, the Bank schooner stands up to a great spread of sail, the main-boom in some vessels being 75 feet long. The big mainsail is the largest piece of canvas on a fisherman and it is carried until the whole strength and skill of twenty to twenty-five men is required to make it fast in a strong breeze.

A CLOUD OF CANVAS IN SUMMER

The orthodox Bank schooner is two-masted—there have been three-masters—and the sails carried are mainsail, foresail, forestaysail, or "jumbo," and jib. These are known as the four "lowers."

In summer, when the topmasts are up, light sails are set, consisting of fore- and main gaff-topsails, a rectangular main-topmast-staysail, and a balloon-jib or jib-topsail. The two latter are often of great size, and when a Banker has her light sails set she is a veritable cloud of canvas.

In winter fishing, the light sails are left ashore and the topmasts are also discarded. In heavy weather, which will not permit a reefed mainsail to be set, a small triangular piece of canvas, known as the "riding sail," or storm trysail, is hoisted on the mainmast. This sail is also set to steady the vessel while lying to an anchor on the Banks or when making short "shifts" from berth to berth on the fishing grounds. When under riding-sail, foresail, and jumbo, a schooner is said to be "under Bank sail."

EVERY BANK SCHOONER IS A SEAFARING DEMOCRACY

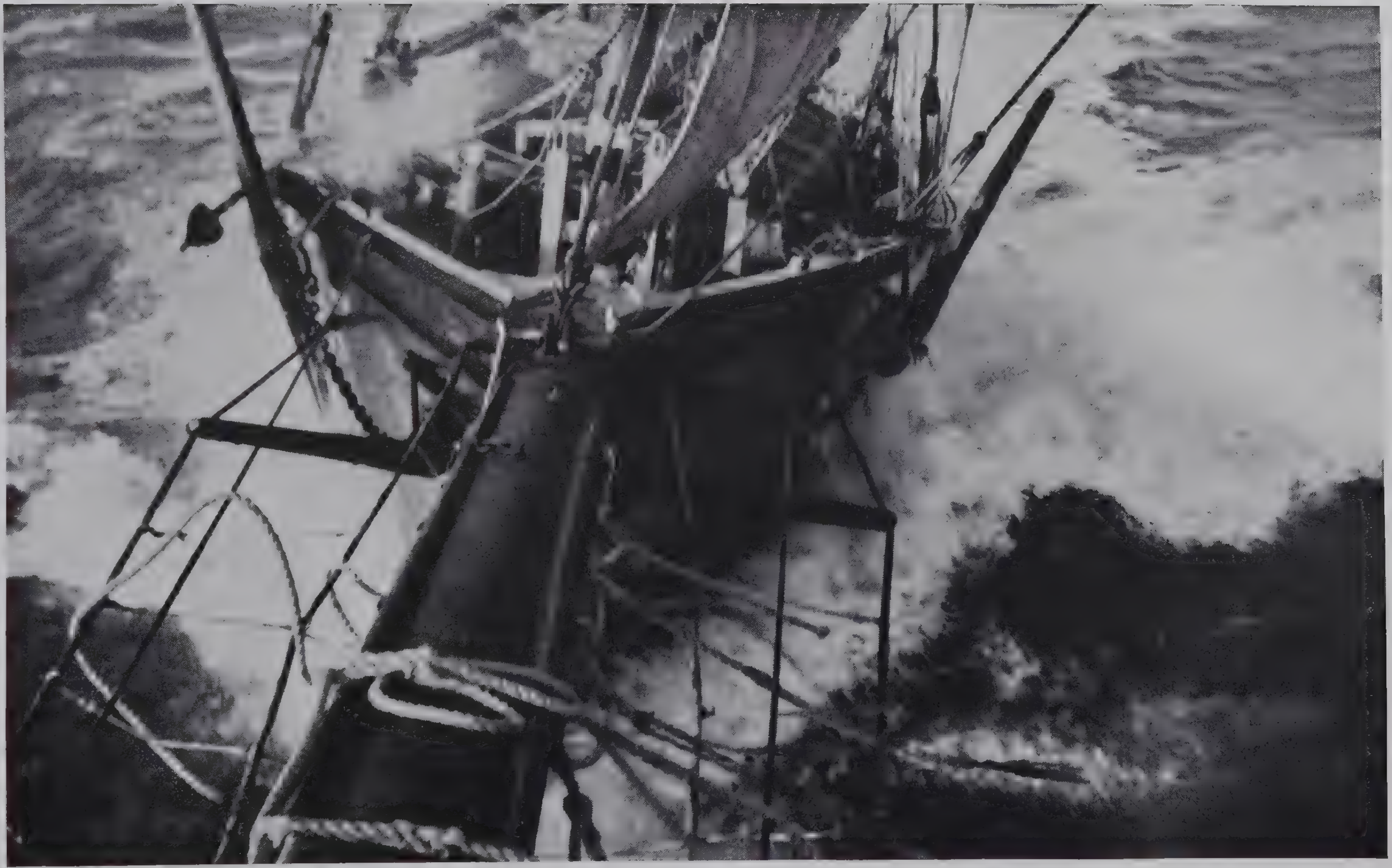
Every Bank fishing schooner is a sort of seafaring democracy. The crew works the ship on a coöperative basis, with the skipper as sailing and fishing "boss." In Canadian and American craft in which the writer sailed, the gang were shipped on the share system, their remuneration consisting of an equal share of the proceeds of the catch after the bills for victualing, ice, salt, bait, cook's wages, and other incidentals had been paid.

The schooner took a quarter or a fifth of the gross stock, and this repaid her owner for the hire of the vessel. Out of this share came the cost of insurance and upkeep, but in good seasons, prior to 1914, many schooners paid their cost of construction within twelve months. In those days, however, a Banker could be built for $12,000; nowadays they cost nearly $50,000.

The share system has had many variants. Formerly, in some vessels, it was "even shares," where all hands drew the same amount. In other craft it was "by the count," where each dory kept count of the number of fish caught and the dory catching the greatest number drew the highest share. The lucky dory was known as the "high line" or "high dory"; the lowest count was "low dory," and in some ships if a pair of fishermen came "low dory" too often they were "fired."

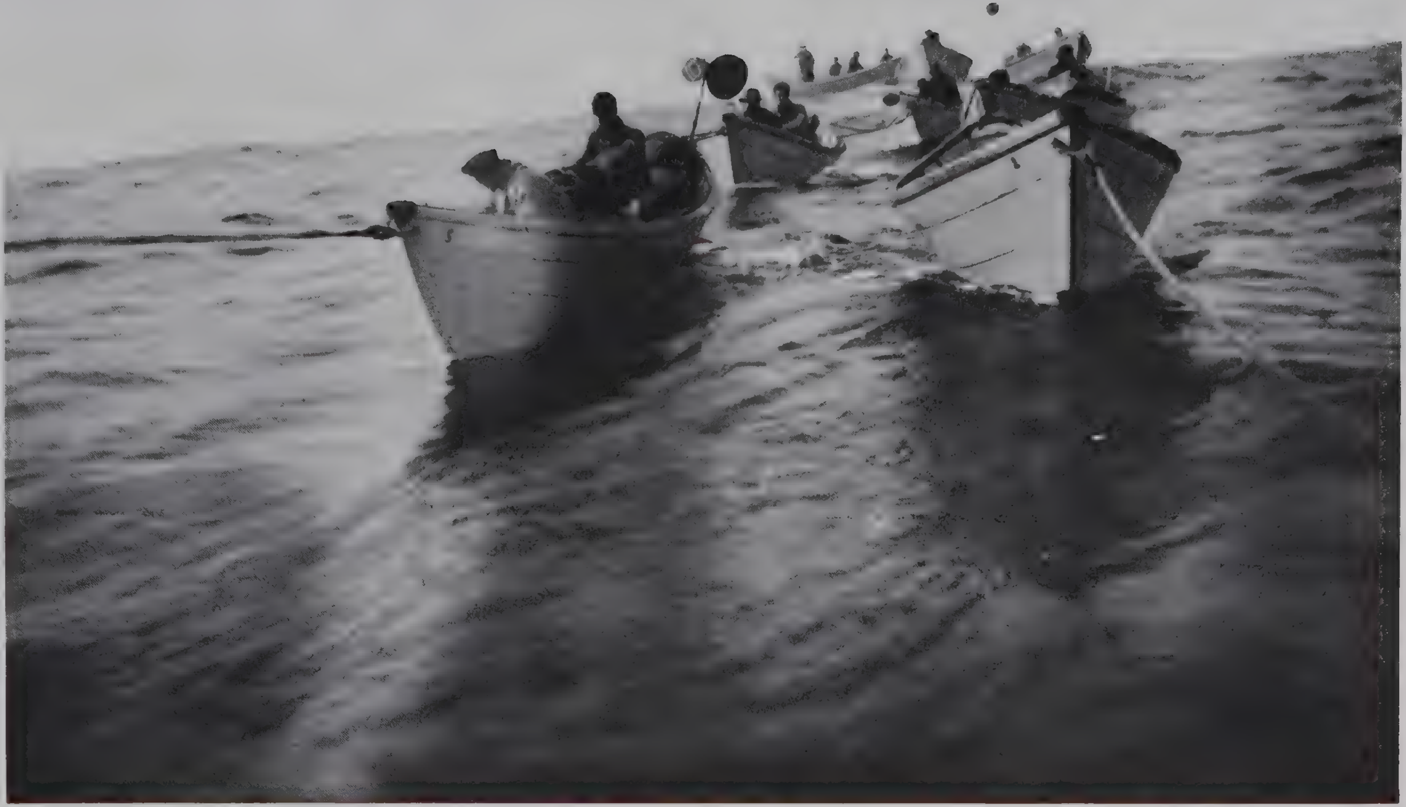
Both of these systems had their drawbacks, and of late years so many new methods of dividing the proceeds of the catch have been instituted in the different vessel fisheries that it would be confusing, and possibly erroneous, to quote any one as being the standard.

In some vessels a wage is now guaranteed and augmented by a share; in others, the owner provides food and gear and the fisherman provides nothing. But the share system, in some form or another,



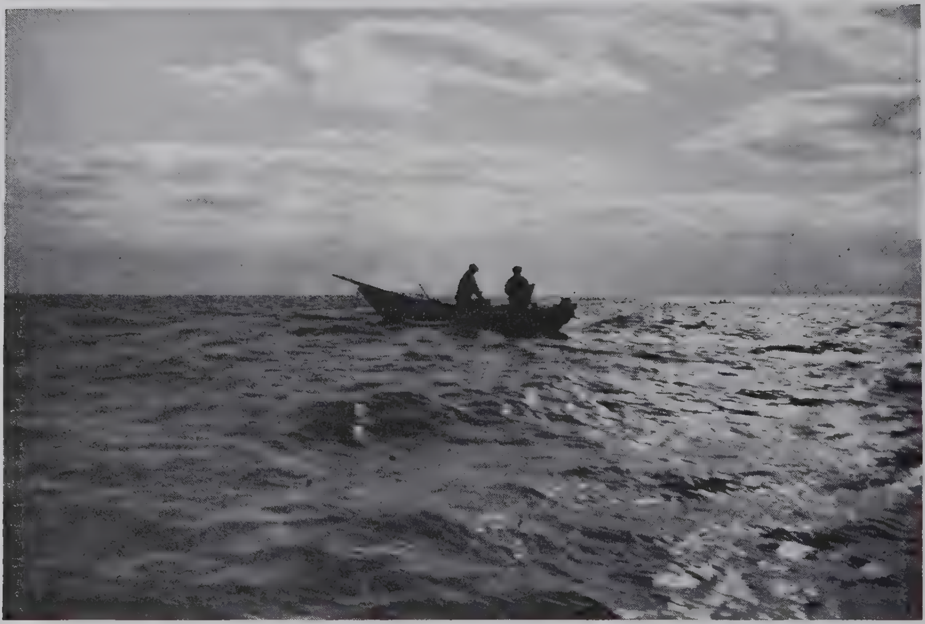
FROM THE END OF THE BOWSPRIT: LOGGING SIXTEEN KNOTS IN A DECEMBER BLOW

A second view of the same schooner shown in the illustration on page 10. In the Grand Banks fleet it is a matter of pride with the skippers not to reduce the spread of canvas until the safety of the schooner absolutely demands it.



"FLYING SETS" ON THE BANK

The dories are being towed by the schooner. The black disks are "high-flyers," or "black-balls," which are affixed to the buoys attached to the fishing lines, as markers (see text, page 20).

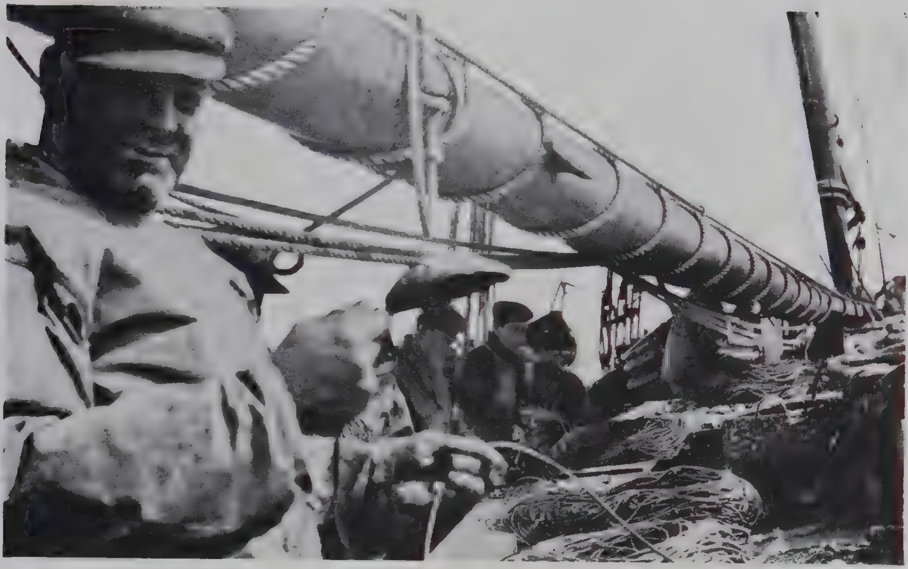


DORIES ON THE BANK

The next dory is barely discernible to the right, in the distance. Sometimes they are strung out behind the parent schooner for five miles.

A DORY COMING ALONGSIDE THE SCHOONER

The tubs in the stern contain the long-lines (see text, page 9).



BAITING HALIBUT LINES WITH FRESH HERRING

There are three kinds of fisheries on the Banks—salt fishing, fresh fishing, and halibut fishing (see text, page 8).

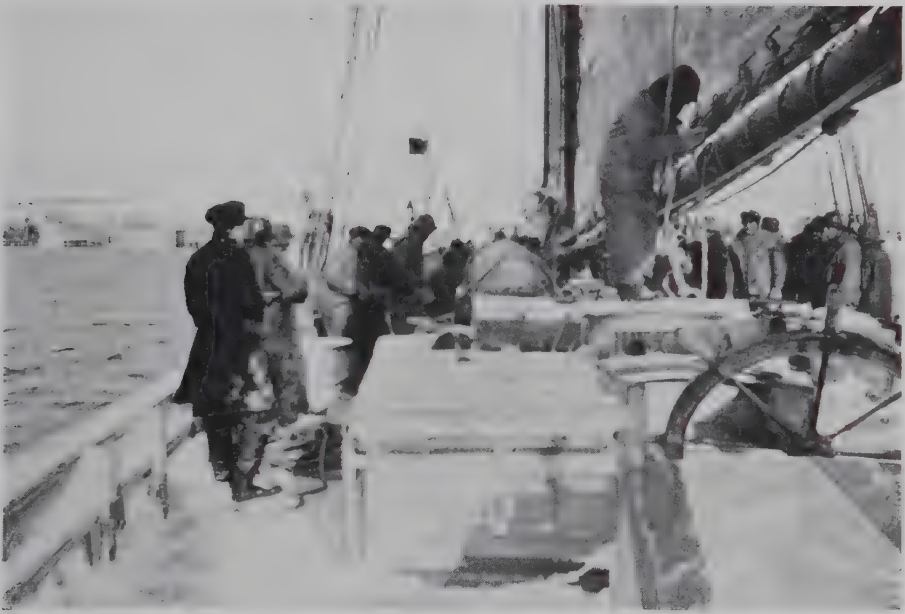
CLUBBING A HALIBUT

This fighting fish must be clubbed before it can be taken into the dory.

TORN TO RIBBONS

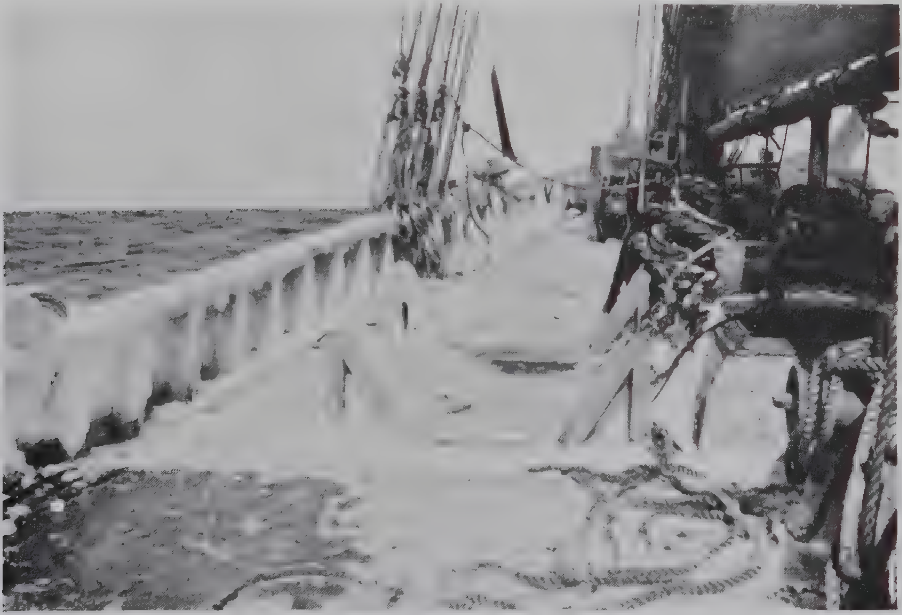
A forestaysail, or "jumbo," which was carried away in a squall.

REPAIRING A TORN SAIL



GETTING UNDER WAY IN WINTER

A schooner sometimes becomes so coated with ice that it is in danger of foundering.



IN WINTER, WHEN THE DORIES ARE OUT ON THE BANKS

MUZZLING A JIB IN A SQUALL

In winter weather, fishing can be carried on only in the lulls between squalls. At this season schooners are stripped for heavy weather, topmasts and light sails being left ashore.

still remains, as no orthodox fisherman would work in any other way. They are all born gamblers and always look forward to the "big trip."

I have been on voyages where the men drew $70 each for a week's work, and on others where they made but $45 in two months. The Goddess of Luck has something to do with the fisherman's remuneration, but the men who fish steadily throughout the year with hard-working skippers usually make a good income, though it is never commensurate with the risks they take.

The crew, or "gang," of a Banker runs from sixteen to twenty-five men. A schooner "running ten dories" would have a crew sufficient to man ten dories with two fishermen in each. In addition to these twenty men, there are the skipper, the cook, a deck-hand, and, if the vessel is an auxiliary, an engineer. In some vessels neither deck-hand nor engineer is carried.

NO FAVORITES ON A BANK SCHOONER

All navigating is done by the skipper. The men are primarily fishermen, but they are under the skipper's orders and must help to sail the vessel, to steer and keep a lookout, and to set and furl sail.

On passages to and from the Banks, the fishermen take regular turns in standing a watch at wheel and lookout. With a gang of twenty men and two men to a watch, this period is not a very long one, as a rule, but in bitter winter weather, with a hard breeze blowing, an hour at wheel and lookout is long enough. I have known times when ten minutes at the wheel required relief to thaw out fingers and toes numbed with zero frost.

When sail has to be set or made fast, all hands are called. If the men are asleep and it is only a small job that requires four or five hands, the whole crowd is turned out to do it. By doing this, no favorites are made and no one can complain that he is being imposed upon. I have seen twenty men roused from slumber to take in a jib—a job three fellows could have done—and the skipper saw to it that no man loafed below.

During the run-off to the "grounds" the fishermen are busy overhauling their

A BIG COMBER

The Bank fishing-schooner will make "good weather" of a hard gale and mountainous sea.

fishing gear. Each man has his dory-mate and his particular dory and they divide the work between them. It is incumbent upon them to have their lines in good shape and their dory properly equipped when the skipper sings out, "Bait up!", the schooner having reached the Bank to be fished.

Six to eight tubs, or skates, of gear have to be kept in order and baited by the two dory-mates—a task which calls for much skill and deftness of fingers, when some 2,000 hooks have to be baited with pieces of herring, squid, or capelin every time a "set" is made.

THE SOUNDING LEAD IS THE SKIPPER'S OTHER EYE

The passage to the Banks may be a run of from fifty to five hundred miles and it is usually made in the quickest possible time.

When the vessel has run her distance, the "spot" the skipper has been making for is found by the lead. The sounding lead is a fishing skipper's other eye and he is usually an adept in determining his position by means of it.

While there are many fishing captains who can navigate by solar and stellar observations, yet the majority find their way about by dead-reckoning, using compass, chart, log, and lead, and their accuracy is often startling.

The sample of the bottom brought up by the soap or tallow on the lead and the depth of water give most skippers an exact position after two casts.

If the gear has been baited and the weather is favorable, the skipper sings out, "Dories over!" The dory-mates who hold the two top dories on the port and starboard "nests" prepare their boats for going overside by shipping the thwarts and jamming the bottom-plugs in.

Oars, pen-boards, bailer, water-jar, bait-knife, gurdy-winch, bucket, gaff, sail and mast, and all other boat and fishing impedimenta are placed in each little craft, and it is swung up out of the nest and overside by means of tackles depending from the fore and main shrouds.

SETTING THE LINES

Two fishermen secure their tubs of baited lines and jump into the dory, which

THE WINTER GULLS

In winter, the gulls surround the fishing vessels by hundreds. During the summer they are not so common.

is allowed to drift astern. The painter is made fast to a pin in the schooner's taffrail and the dory is towed along by the schooner. As the other dories are launched, they are dropped astern, made fast to each other, and towed by the schooner (see illustration, page 13).

When all the dories are overside, the skipper, at the wheel of the schooner, determines the direction in which he wants to set his lines, and the dories are let go, one at a time, as the vessel sails along. A schooner "running" ten dories will have them distributed at equal distances along a four- or five-mile line and Number One dory is often out of sight from the position of Number Ten.

When the last dory has been dropped, the skipper will either "jog" down the line again or remain hove-to in the vicinity of the weather dory while the men are fishing.

In the dories, when the schooner has let them go, one fisherman ships the oars and pulls the boat in the direction given him by the skipper, while the other prepares the gear for "setting."

The end line of the first "tub" of baited long-line is made fast to a light iron anchor to which a stout line and buoy-keg is attached. This is thrown over into the water, and the fisherman, standing up in the stern of the dory with the tub of long-line before him, proceeds to heave the baited gear into the sea by means of a short stick which he holds in his right hand.

With this "heaving stick" he dexterously whirls the coils of line and hooks out of the tub and the long-line goes to the sea-bottom.

Three or four tubs, the lines joined together, may be set in this fashion, and another anchor and buoy is made fast to the last end. The long-line now lies on the bottom of the sea and is prevented from drifting or snarling up in bottom or tidal currents by the anchors at each end.

The fishermen in the dory hang on to the last anchor until it is time to haul the gear, or they may leave it altogether and pull back aboard the schooner again, leaving the location of their lines to be marked by a flag or "black-ball" thrust into the buoy-keg attached to the anchors at each end.

READY FOR THE HAUL

The lines may be "set" for periods varying from thirty minutes to half a day. In the latter case the fishermen will be towed back to their gear again by the schooner and cast adrift when the buoys marking their respective lines appear in sight.

The picking up of these tiny buoys and flags, scattered over five or six miles of ocean, is quite a knack, and the fishing skippers seem to possess an uncanny sense of location in finding them. The writer has known schooners being forced to leave their gear in the water and run to port for shelter in gales of wind, and to return two or three days afterward and pick it up again without much trouble.

When ready to haul the long-line, the fishermen insert a lignum-vitæ roller in the gunwale of the dory and pull the anchor and buoy up.

The end of the line fast to the anchor is detached and the fisherman, standing in the bow of the dory, commences to haul the long-line out of the water. His dory-mate stands immediately behind, and as the line comes in it is his job to coil it back into the tub again after knocking off the untouched bait.

A NEST OF DORIES AND BULWARKS COVERED WITH ICE

The fisherman hauling the line over the roller disengages the caught fish by a dexterous twist of the arm. This back-handed jerk whips the hook out of the jaws of the fish and it flops into the bottom of the dory. Fish which cannot be cleared in this manner are passed on to the man at the tub, who twists the hook out by taking a few turns of the snood around the "gob stick," which he thrusts into the mouth of the fish.

A VOLLEY OF "SLATS" MEANS POOR HAULS

Unmarketable species—sculpins, skate, dogfish, etc.—are knocked off into the sea by a vicious slat against the dory gunwale. On a quiet summer's day there is no more disheartening sound to a fishing skipper than to hear a continuous volley of "slats" coming from the line of dories. It means that the dogfish are swarming on the grounds, and that they have taken the hooks intended for better fish.

When the lines have been hauled and the last anchor is up, the fishermen row or sail down to the schooner, which is generally hovering around like a hen keeping guard over her chickens. The dory rounds up alongside the vessel, the painter is caught by some one aboard her, and, after handing up their tubs of long-lines, the two fishermen pitch out their fish upon the schooner's decks.

A PEN OF CODFISH ON A SCHOONER'S DECK

At the end of the day in the dories the work of "dressing down" the catch begins (see text on this page).

Certain sections of the deck have been penned off for the reception of the catch, which prevents the fish from sliding to leeward when the schooner rolls.

THE JOB OF DRESSING DOWN THE CATCH

At the end of the day, when all hands are aboard, the work of "dressing down" the catch commences. The fish are split and gutted, and some species are beheaded, by the fishermen, standing at tables rigged up on deck. The dressed fish are then washed in tubs of salt water and consigned to the hold, where they are packed away on chopped ice.

If the vessel is salt-fishing, the fish are piled upon each other in the hold-pens and liberally covered with coarse salt.

After the catch has been cleaned and stowed away, the men bait up their gear for the morrow's "set." If the fish are biting freely and the catch is heavy, the fisherman's day is a long one. Dories will often be swung overside before sunrise and the men will finish by midnight.

There is very little sleep to be got on the Banks when the weather is fine and the vessel is "on fish," and the writer remembers one occasion in winter fishing on a market fisherman where the gang were kept hard at it from Sunday night to Thursday morning with but an hour's sleep each night. On Thursday a gale of wind came along and it was hailed with pleasure, as an opportunity to "lay off" and catch up on slumber.

FOG, THE FISHERMAN'S WORST ENEMY

The foregoing description is that of the life on a market or fresh-fishing schooner running her catches to port for consumption in a fresh or smoked state.

The "marketmen" seldom remain at sea longer than ten days, but life aboard these craft demands the greatest skill and hardihood on the part of skipper and crew. They waste no time in getting to the fishing Banks, and usually go tearing out under a press of sail. Dories are hoisted over before dawn, and the men often fish all night, with torches aflare on the dory gunwales. They will go overside in pretty rough weather and will remain out until the last minute, in the face of fogs and squalls.

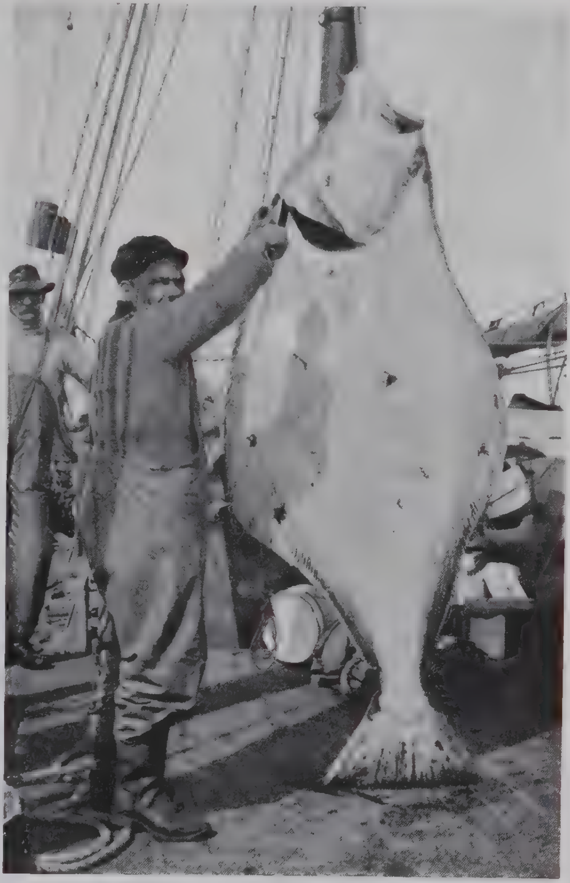
In summer, fog is the fisherman's

worst enemy. Dories may be strung out when it is fine and clear, and before they can be picked up again they are blanketed from view in a wet, sight-defying mist.

The skippers are wonderfully clever at locating the hidden dories, but it often happens that some cannot be found, and their names are listed with the yearly death toll of the Banks.

But there are not many casualties, considering the frequency of the fogs, and I can remember one occasion when 56 dories were reported astray from their vessels and all were either picked up by other schooners or else rowed in from the Banks to the land. Some of the distances stray fishermen have rowed in dories seem incredible, but a pull of 150 to 175 miles in rough weather and without food is not an unusual accomplishment.

A few years ago, during April, two fishermen got astray from their vessel on Quero Bank and were picked up *fourteen days* afterward 30 miles northwest of St. Pierre. They had but a little cake and some water to sustain them during that period and only managed to keep from freezing to death by constant rowing. One man's feet and hands were black from frostbite when picked up.


A BIG FELLOW. A GULF OF ST. LAWRENCE HALIBUT WEIGHING ABOUT 300 POUNDS

THE SIREN STRIKES TERROR

Fog inspires fear in fishermen by reason of the danger of being run down by steamers. Many schooners have been sent to the bottom thus, and the roar of a steamer's siren close aboard in foggy weather will have a crowd of fishermen out of their bunks quicker than anything else I know of.

It is a most disturbing sensation to be lying becalmed and helpless in a clammy mist and to hear a steamer blowing in the vicinity. One never can tell from which direction she is coming, and the fishermen blow horns, light torches, fire guns, and ring bells when the dreaded blast is heard.

During the winter months the Banksmen fishing for market endure some strenuous times. Chilling cold, strong winds, rough seas, and ice and snow make of dory-fishing at this season a somewhat risky and desperately arduous occupation.

THE FINEST BOATMEN IN THE WORLD

The schooner is stripped for heavy weather, topmasts and light sails are left ashore, and fishing is carried on during the lulls in the squalls. Time is valuable

HOMEWARD BOUND: A BANKER IN WINTER RIG

on market Bankers and only a steady gale will keep the fishermen aboard the schooner.

If the weather is intermittently squally, the dories go overside and make "one-tub sets," coming aboard the schooner when it is snowing and blowing too hard and setting out again when the flurry eases off.

It is in weather like this that one is compelled to give the Bank fishermen their due. To see them swing their dories overside on a black winter's morning and pull out over a tumbling sea and set their lines with a torch aflare on the dory gunwale is a most impressive sight. One can see them on a windy day toiling and tossing in their frail craft on a cresting waste of gray waters and blotted from sight every now and again by squalls of snow.

To set and haul their gear, to pull a heavy dory with a load of cod and haddock in a broil of wind-whipped combers, demands a skill and hardihood which makes the American Bank fisherman the finest boatman in the world.

The low temperatures which often prevail in our western waters in winter add to the fisherman's trials. Dories often become so heavily encased in ice that they are in danger of foundering with the weight of it. Schooners also run the same danger, and it is not an uncommon occurrence for a vessel to be so heavily iced-up that she dare not venture any longer toward the coast, but is compelled to run offshore, to the warmer temperatures in the Gulf Stream.

BRAVING THE GALE WITH LASHED WHEEL AND BARE MASTS

When on the Banks, fishing vessels do not run for harbor every time the barometer foretells a gale. The usual thing is to take it hove-to under foresail and jumbo, and this sail can be reduced down to a reefed foresail if necessary. In one tremendous winter gale, we had to haul everything off the schooner, and she lay for four hours under bare poles, with wheel lashed and all hands below.

The modern Bank fishing-schooner will make "good weather" of a hard gale and a mountainous sea and seldom take aboard any water to hurt; but life on a fishing-schooner hove-to in such weather is by no means pleasant. Its fearful leaps and plunges make it almost impossible to walk one step without hanging on to something, and the muscles of the body become strained and sore with the jolting and swinging. To eat and sleep under such conditions as the fishermen do calls for unusual stamina.

The living quarters in fishing-schooners are in forecastle and cabin. These apartments are lined with bunks—possibly sixteen single bunks forward and four to six double bunks aft.

The galley is located in the after part of the forecastle and the mess-table is fitted between the foremast and the windlass-pawl-post. All hands eat their meals in the forecastle.

The skipper lives aft, in the cabin. In some schooners he has a little room to himself, but in a good many he sleeps in an open bunk like the fishermen. The galley stove keeps the forecastle warm, and a small "bogey," or base-burner, heats the cabin.

As fishermen are constantly wet, the stoves are kept continually fired to dry out sodden clothing.

THE FISHERMAN FEASTS LIKE AN EPICURE

Though it is a hard, cold, and hazardous existence, yet the fisherman's life has some compensations. The cooks carried are masters of the culinary art and the meals provided are of the most luxurious description. All the staples and all the luxuries go aboard a fishing vessel, and the scale of victualing is Biltmore style without the silver and cut-glass.

A fisherman is always hungry, and in addition to three square meals per diem, he indulges in a "mug-up" between times from the "shack locker," or quick-lunch cupboard in the forecastle. Tea and coffee are always on the stove.

With stoves going below, it is always warm and pleasant in cabin and forecastle, and a fisherman's bunk, with a good thick quilt or blanket and a straw mattress, makes a snug sleeping place. One never sheds many clothes on retiring; the discarding of boots and jacket is enough.

The cabins and forecastles are clean and well kept. Vermin is a fisherman's horror, and the writer has known men of questionable cleanliness to be sent ashore.

There is a certain spirit of independence to the fisherman's life which makes it attractive. He is under no master but

A TYPICAL FISHING VESSEL SKIPPER

THE BANKER'S COOK

This deep-sea chef will feed a hungry crowd of twenty-five men with a plentiful variety of well-cooked food, three times a day, in fair weather or foul.

A MOONLIGHT EFFECT ON THE GRAND BANKS

the skipper, whose rule is a fairly tolerant one. The men obey his orders without question. It is he who finds the fishing grounds, and the harder he keeps them working, the more money they will draw when the catch is sold.

A hard-driving, hard-working skipper can always pick up a crew, while the easy-going vessel master is not likely to be a big "fish-killer" and will never secure the best men.

THE RACE TO MARKET

Then there is the sailing. A smart vessel is a fisherman's pride, and he will never lose an opportunity to try her out against other craft. Your fisherman is a sail-dragger. He believes in carrying his canvas to the last minute, just for the fun of seeing her go. To be one of a fleet of Banksmen "swinging off" for market in a stiff breeze is to confirm one in the belief that the American fisherman is the finest sailor of the present day.

Sail is crowded on the schooner until her decks are like the side of a house and the scuppers are abroil with water. Fourteen to sixteen knots an hour have often been made, and some skippers take a pride in their ability to carry canvas and refuse to reduce sail until the lee-rail is under water.

The fisherman is a pretty good helmsman and can, as a rule, steer these quick and jaunty schooners "through the eye of a needle." Their nerve in steering a vessel running before the wind and sea with the big main-boom "broad off" is often commented upon, as in heavy weather this is the most dangerous point of sailing in a fore-and-after.

THE SKIPPER IS A MAN OF MARK IN HIS PROFESSION

The American Bank fishing skipper is in a class by himself. He is usually a fisherman with ambition, who comes out of the dory and makes a bid for the command of a vessel. It is a profession that is not overcrowded, and the successful fishing skipper is a man of mark by process of survival.

Many a man takes charge of a fishing craft and fails to make good. There is no come-back for him. Even if an owner entrusted him with a vessel again, it is doubtful whether he would get a crew. Fishermen do not sail with doubtful skippers or known failures.

The ability to sail and navigate a vessel is secondary to the ability to find and secure fish. Some skippers are lucky, but real hard work spells the story of success.

The "high-line" skippers have always been "hustlers." They hustle the vessel out to the Banks, hustle the dories over the side, and keep the crowd hustling as long as the weather allows. If it comes on to blow, they hang to the Bank until it eases off and swing the dories over while the seas are smoothing down.

Even though not particularly lucky in striking big "jags" of fish, yet the hustling policy of these skippers tells in the long run. They lose no opportunity to get the lines in the water and always plan to bring aboard some fish every day. After a week or ten days of this work, they invariably hustle off to port with a paying catch.

MEN MUST HAVE CONFIDENCE IN THEIR SKIPPER

The successful Bank skipper must be a smart vessel-handler, to inspire confidence in his gang. They prefer to go out in the dories secure in the knowledge that the skipper can pick them up again if it comes on to blow. The skipper who gets adrift from his crowd in squall or fog will find it hard getting a crew to ship with him again.

He must be an optimist and a diplomat, to handle the independent crowd who sail with him. He must never show nervousness or fear in dangerous situations and he must be ever ready to do the right thing at the right moment.

The men pin their faith on the skipper and trust him implicitly. Should he show anxiety as to his whereabouts in dangerous waters in thick weather, or become confused when the wrong turn of the wheel may lead to a collision, his crew become panicky and will lose their faith in his ability.

He must also be something of a business man and keep the expenses of the trip down as much as possible. There is no profit in catching just enough to pay the outfitting. He is expected to know where bait can be procured at certain seasons and to run in and purchase it at the lowest price and without the loss of too much time, and his good judgment is called for a hundred times during a voyage.

To be at once a navigator, a sailor, a fisherman, a diplomat, and a business man makes of the American Bank fishing skipper an outstanding type, and the most of them are splendid fellows. They earn good money, but deserve every penny of it.

THE SALT FISHERMAN'S LIFE IS EASIER

While we have taken the market Banker as a study in the foregoing, the salt Bank fisherman and halibuter present but little differences. The fishing is carried on from dories in a somewhat similar manner, but the salt fishermen, as a rule, take life easier. The season for salt fishing extends from March to October, and the schooners make from two to four trips during that period. The method of fishing by "flying sets"—towing the dories and dropping them over the Bank—is carried on to some extent by salt fishermen, but these craft usually anchor on the Bank, and the dories row away from the vessel, take up their position, and set the gear.

If fishing is good, the lines are left in the water and "under-run"—*i. e.*, the fish are taken off and the hooks immediately baited again without hauling the whole line up and taking it aboard the schooner to do so. When the fish begin to thin out, the gear is taken up and the schooner makes sail for another fishing ground.

Halibut fishing is possibly the most exciting of all. Cod, haddock, and similar species are quiet fish, with but little life in them when hauled up from the bottom. But the halibut is a fighter and has to be clubbed by the dory-men before being taken into the dory.

In the summer months, when the fish are inshore in shoal water, the halibut is a troublesome fellow to land. I remember while halibut fishing around Anticosti, in the Gulf of St. Lawrence, the terrible struggles we had with fighting halibut in forty and fifty feet of water. The writhing and squirming of a hundred-pounder would give a fisherman all he could manage in getting him aboard the dory, and very often he would have to cut the snood and let the fish go, lest by his struggling he capsize the boat.

Even when the fish has been clubbed into quietness and hauled into the dory, he will wake up and thrash the oars, thwarts, and gear overboard by the smacks of his tail. Old-time halibuters provide for this contingency by lashing the halibut's tail to the rising-strips of the boat.

In deep water, say 100 fathoms, the halibut are not so wild. The long pull from the bottom to the surface has exhausted the fish and they are more easily handled.

An instance of the daring of fishermen was seen by the writer on a halibut trip when, during a savage squall, a heavily loaded dory was half swamped by a comber. The two dory-mates tied lines to some of the fish and hung them overboard to lighten the boat, while one man bailed and the other kept the dory bows-on to the sea. Unable to row down to the schooner with the fish overside, they remained thus for two or three hours, until the vessel worked to windward of them and picked them up.

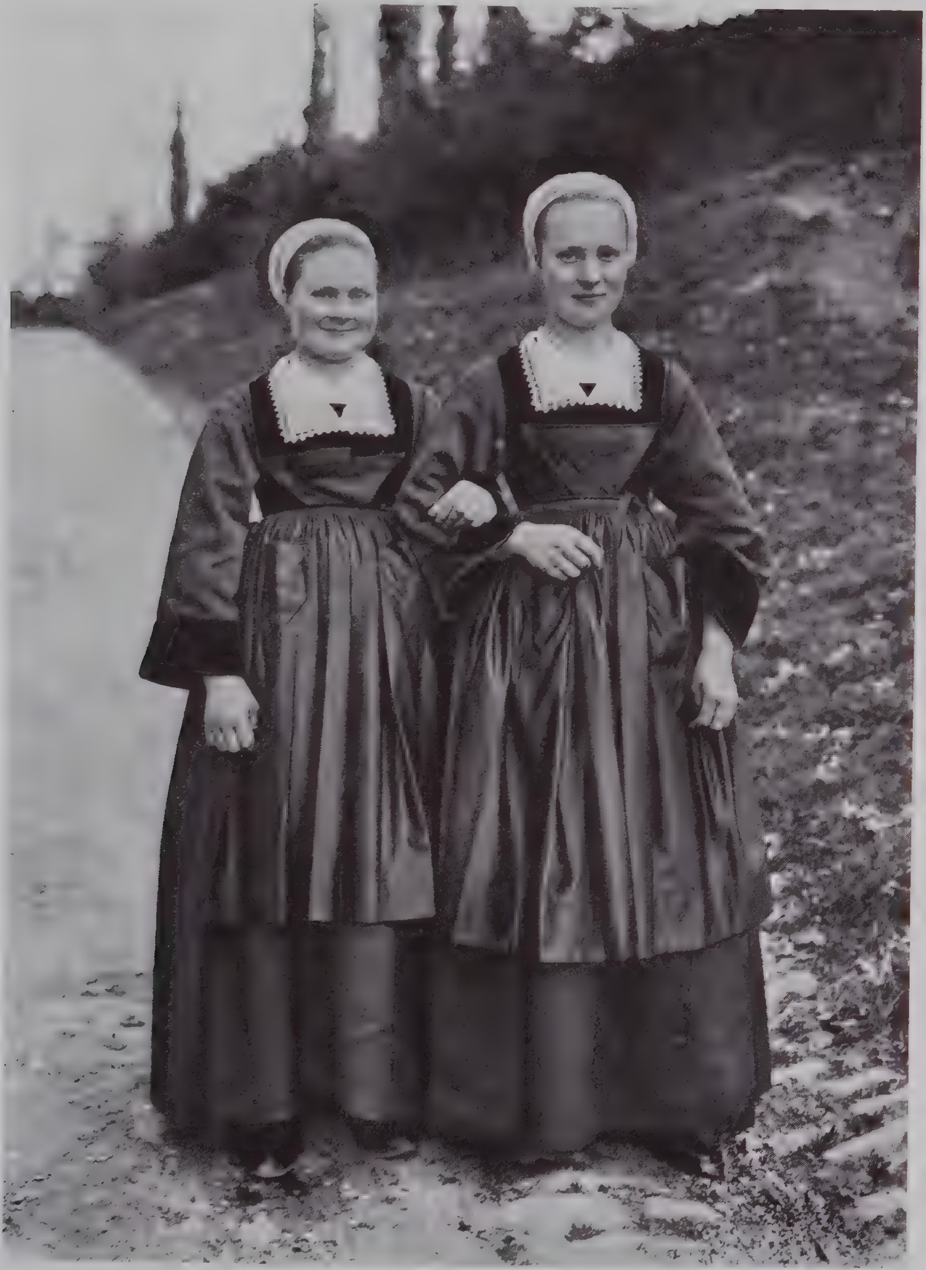
HAND-CAUGHT FISH ARE SUPERIOR

In addition to long-lining from dories, a few vessels fish by means of hand-lines from dories. Hand-line dories are a trifle smaller than the others and one man usually fishes from them.

The hand-line is equipped with two or three hooks and a lead sinker, and the fisherman will operate several lines at a time. Cod and haddock caught by hand-line are conceded to be superior to long-line-caught fish, and this method is employed in both fresh and salt Bank fishing.

The age of the clipper ship and the seamen who sailed them is gone, but in the American Banksmen we find the smartest sailing craft and the smartest sailormen afloat today. But the steam and motor trawler is coming into the American fisheries and many of the tall-sparred schooners are having their sails and masts cut down and internal-combustion engines installed.

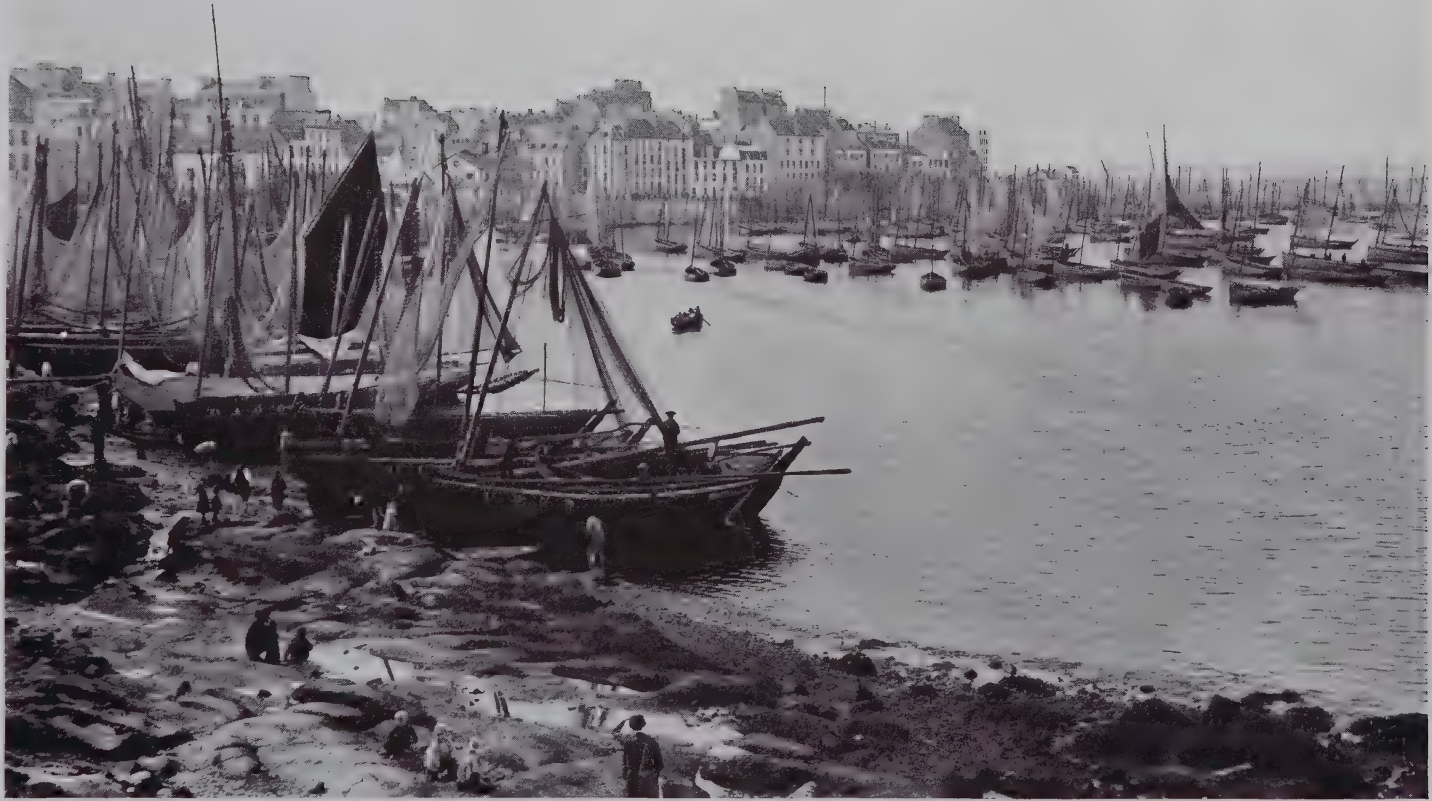
In a few years from now the schooner fleet will give way to power and the sailor-fishermen who drove these smart and able hookers over the seas will have evolved into sea-mechanics.



Photograph by Creté, Ltd.

TWO BRETON M'SELLES

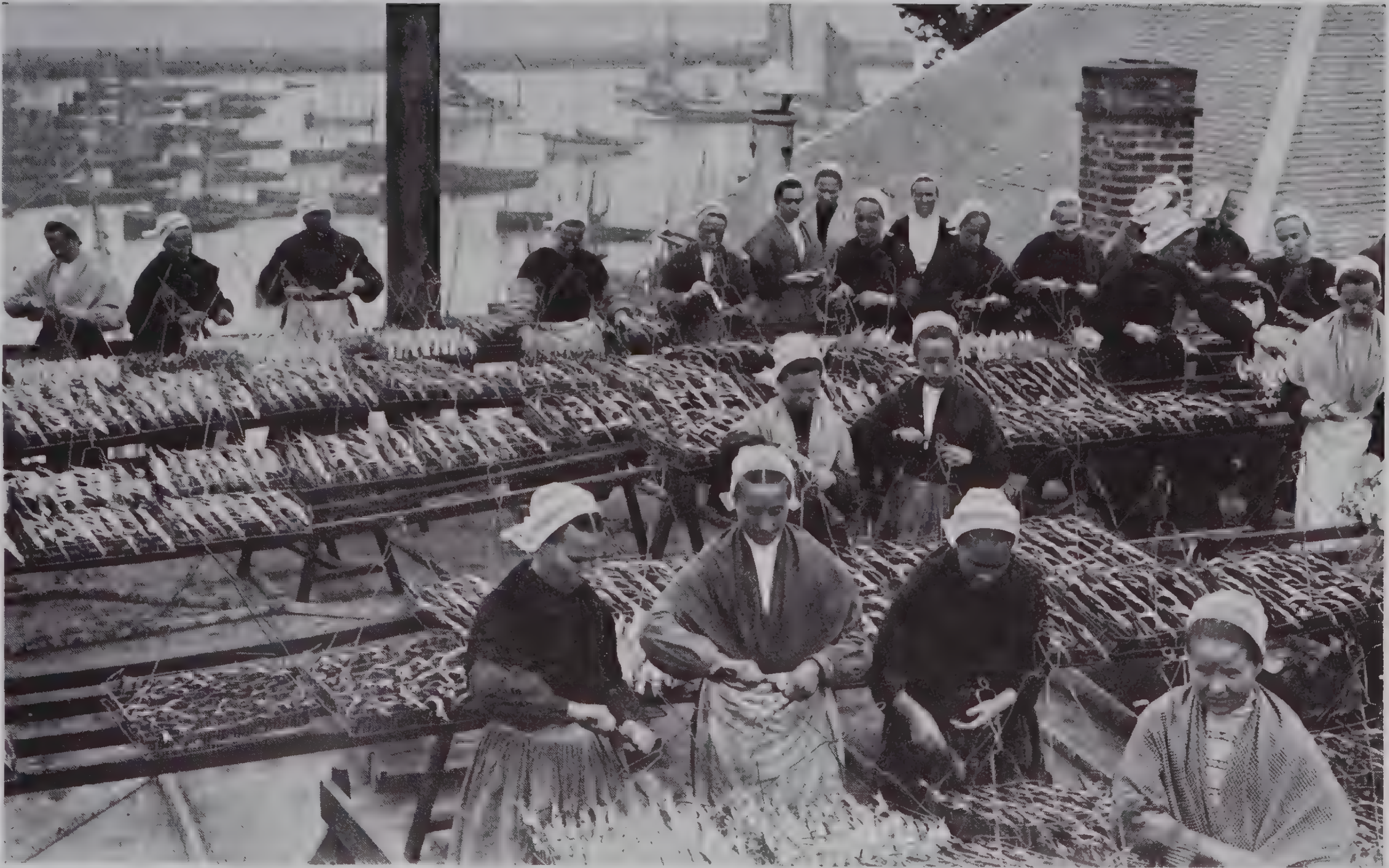
The peasants of Brittany wear costumes of the same design from generation to generation. Women and girls wear snow-white linen collars and lace-bordered caps in a wide variety of shapes. Each peculiarity of design has its meaning, and indicates the home district of the wearer. These two young women live at Huelgoat, a village in Finistère, the westernmost department of France, whose largest city is Brest.



Photograph by Creté, Ltd.

WHERE THE HUMBLE SARDINE REIGNS SUPREME

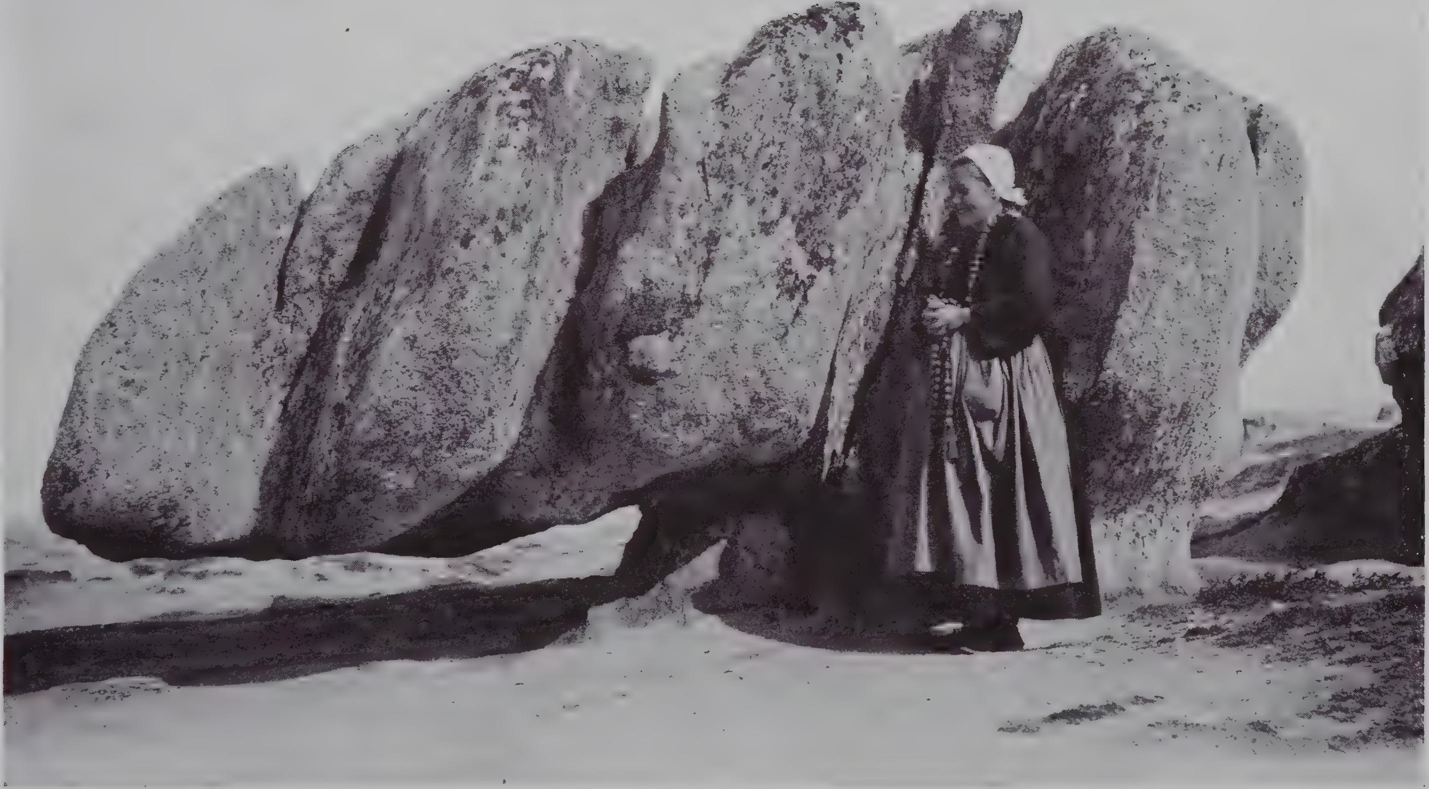
Douarnenez, situated on the fine bay of the same name, on the northern Atlantic coast of France, is an important center of the sardine industry. Hundreds of sturdy little fishing boats put out from here, and return laden with myriads of miniature fishes, to be packed into tins and shipped to all the world.



Photograph by Creté, Ltd.

DRYING SARDINES IN BRITTANY

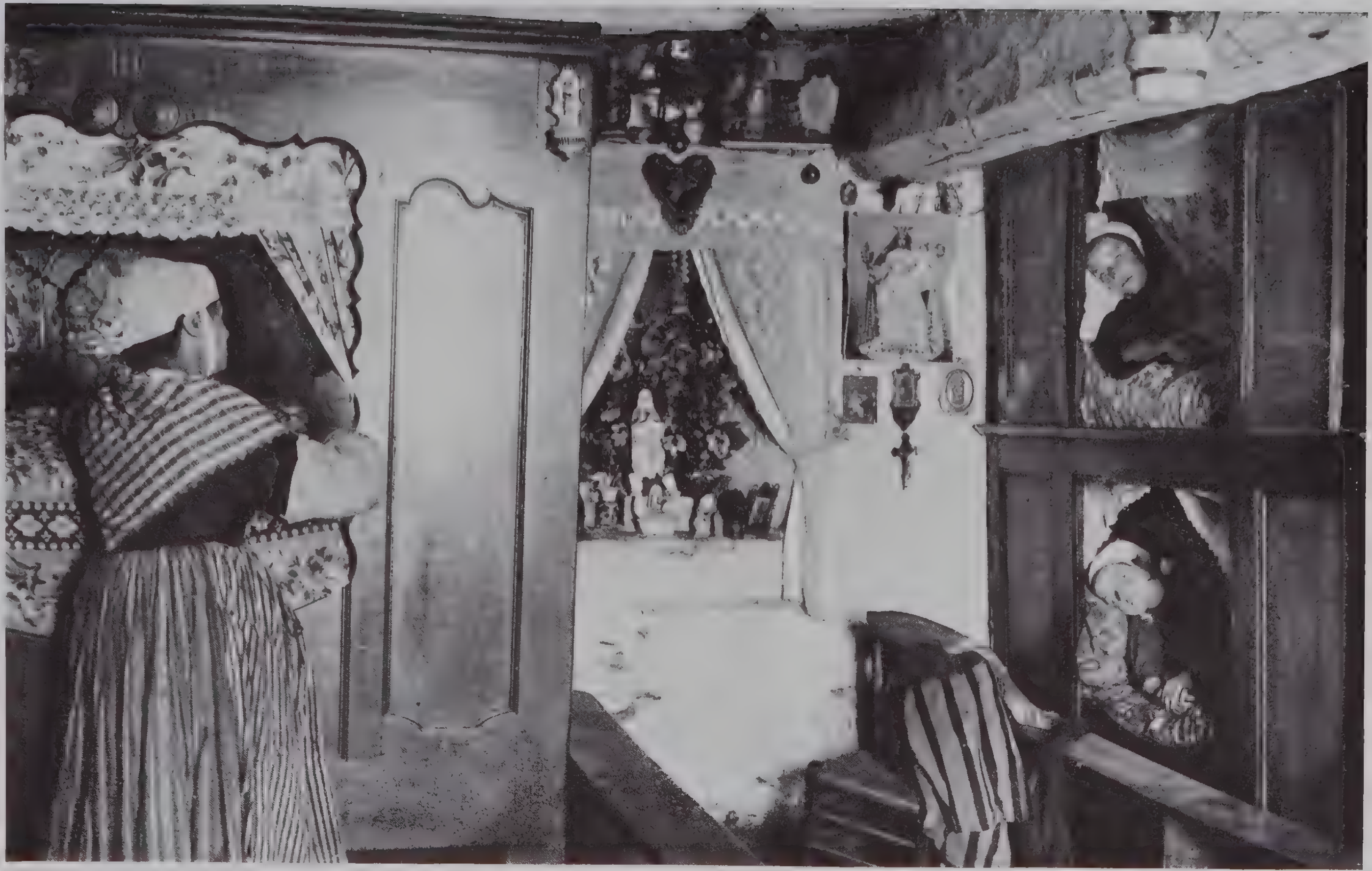
Men, women, and children depend upon the sardine for a livelihood in Brittany, and a hard winter, which interferes with the fishing, brings distress to all the people. Breton fishermen are numerous in the French navy, and it has been estimated that nearly three-quarters of its best seamen received their early training on stormy seas in the sardine fleet.



Photograph by Creté, Ltd.

BRITTANY IS A LAND OF LEGEND

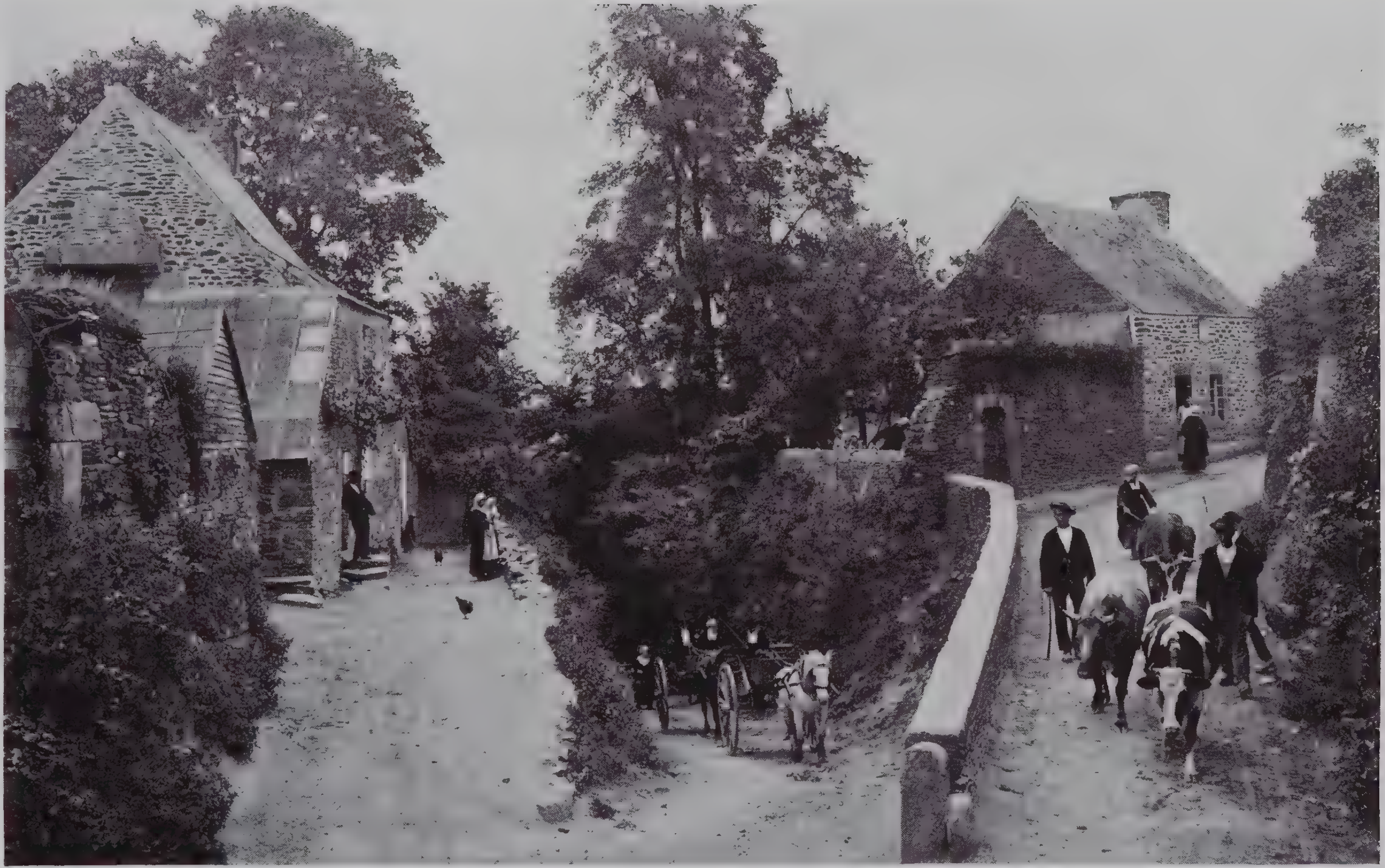
Relics of the Druids in the form of these great megaliths are scattered over the Breton moors, and many are the weird stories which the peasants tell about them. The hieroglyphs of Egypt and the cuneiform script of ancient Babylonia and Assyria are simple when compared to the mystery of these monuments of a forgotten race. The Breton wife who wishes to become a mother believes that her hopes will be realized if she stands beside the stone shown in this illustration.



Photograph by Creté, Ltd.

INSIDE A BRETON HOME

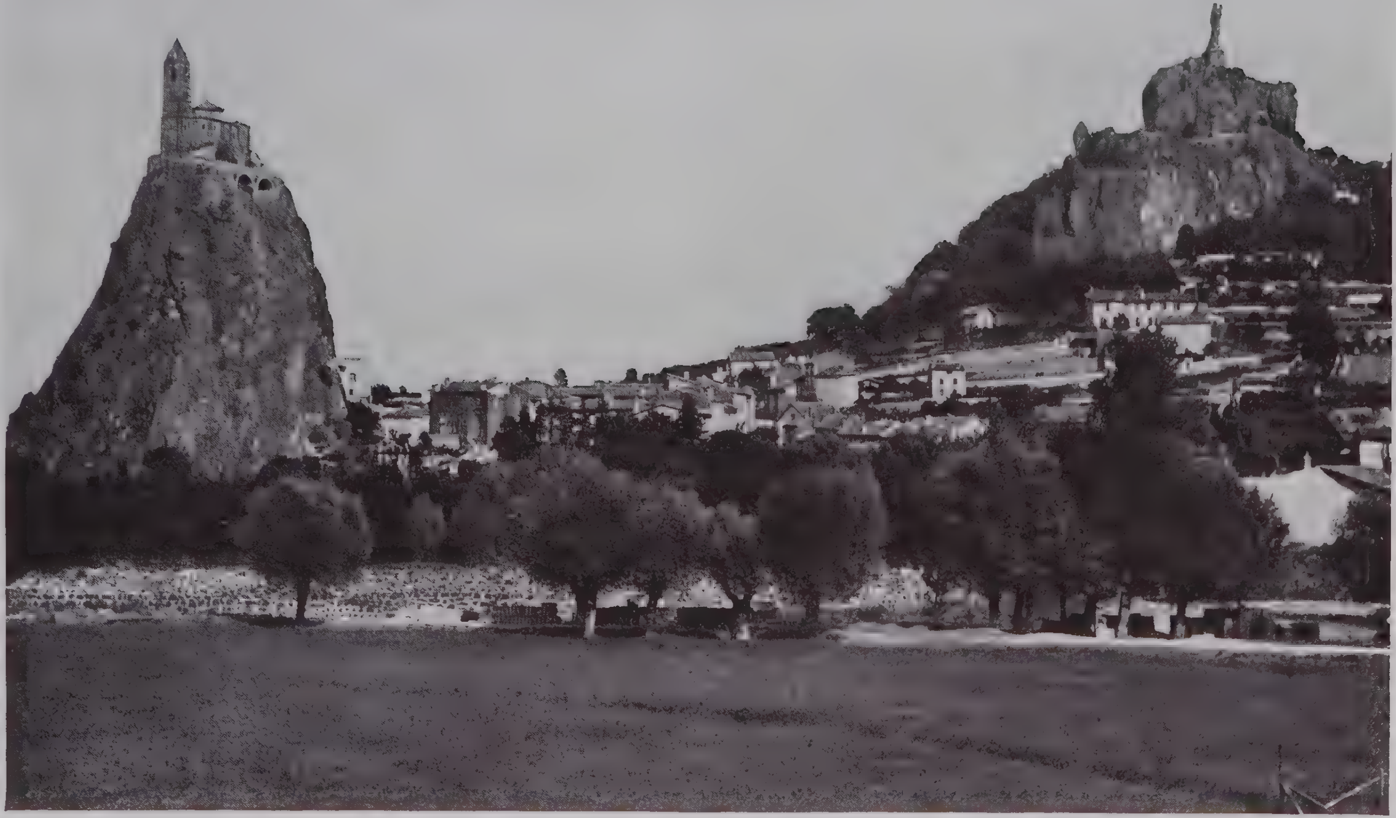
The one-room Breton farmhouses have floors of hard-trodden earth; the ceilings are ribbed with rough-hewn rafters, from which hang knives, forks, pans, pots, dishes, and other household articles. The beds, or bunks, one above another, occupy niches in the thick walls and have sliding panels, to be closed when the beds are not in use. Beneath the bottom bunk is usually a compartment where the family linen is stored. Sunlight and fresh air are strangers to such interiors.



Photograph by Creté, Ltd.

UPS AND DOWNS IN BRITTANY

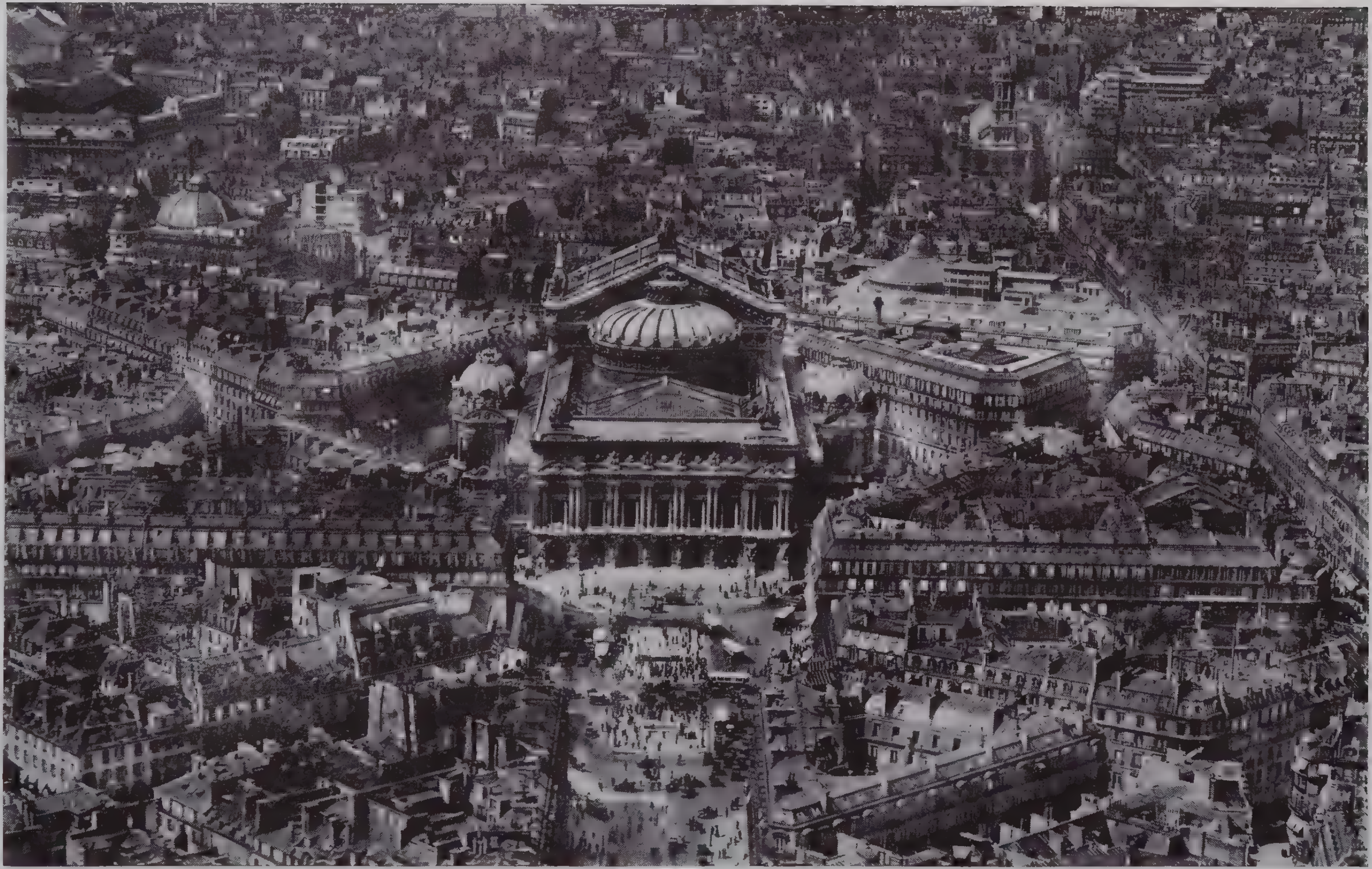
In ancient days this little town of Carhaix, which is now known chiefly for its excellent breed of cattle, was a place of importance and capital of the Osismii, one of the tribes of Gaul which took an active part in the wars against Cæsar. The remains of a Roman aqueduct are still to to be seen here.



Photograph by Creté, Ltd.

IDENTIFYING FEATURES OF THE CITY OF LE PUY, IN SOUTHERN FRANCE

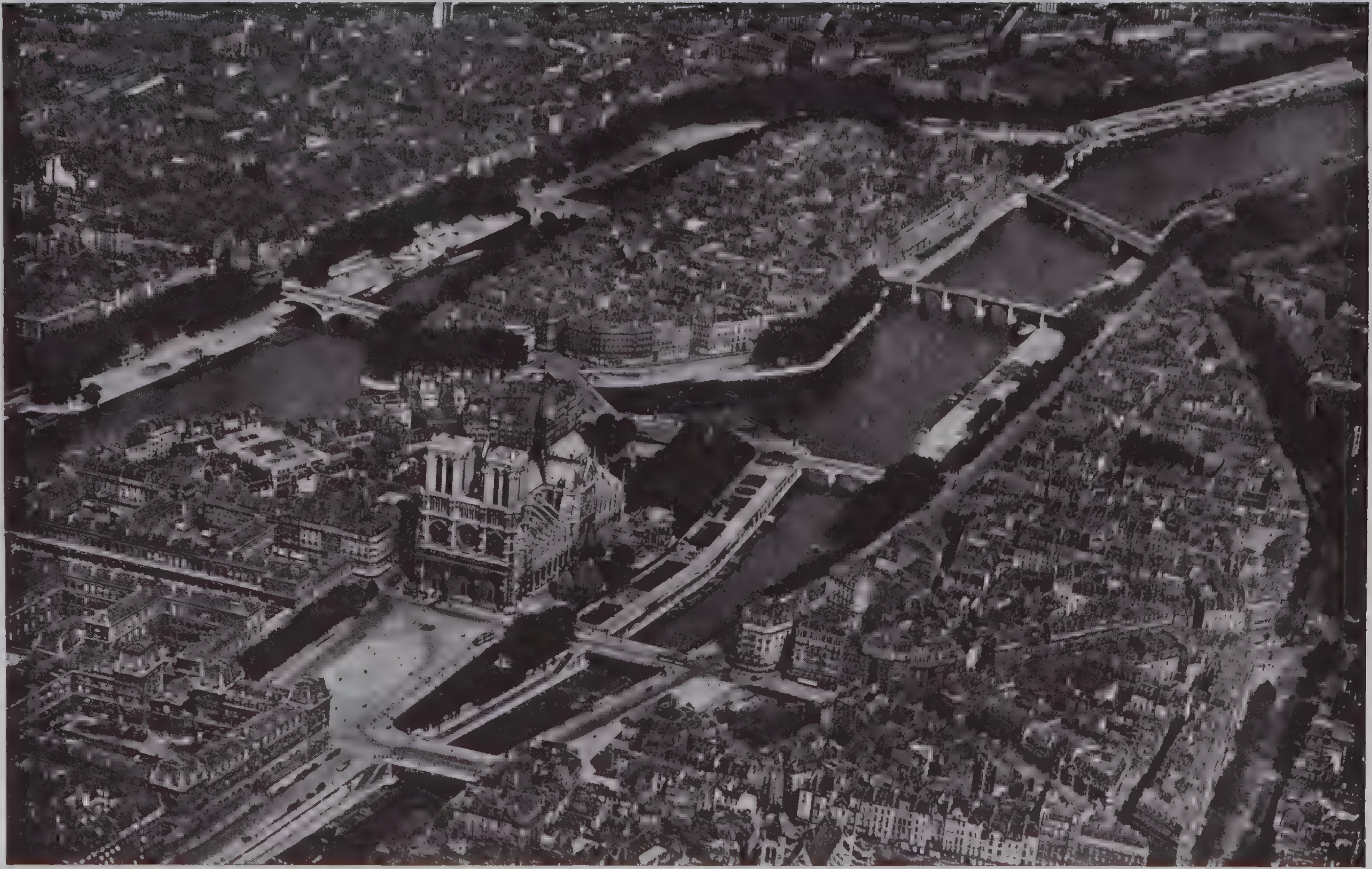
At the left, on the top of a basalt rock, stands the tenth-century Romanesque Chapel of St.-Michel d'Aiguilhe. At the right, on the top of a still higher rocky upthrust, is the colossal statue of Notre-Dame-de-France, molded from the metal of more than 200 Russian cannon taken at Sebastopol, in the Crimean War. The city proper, containing many fine medieval houses, lies to the right.



Photograph by U. S. Army Air Service

THE CENTER OF MODERN PARIS

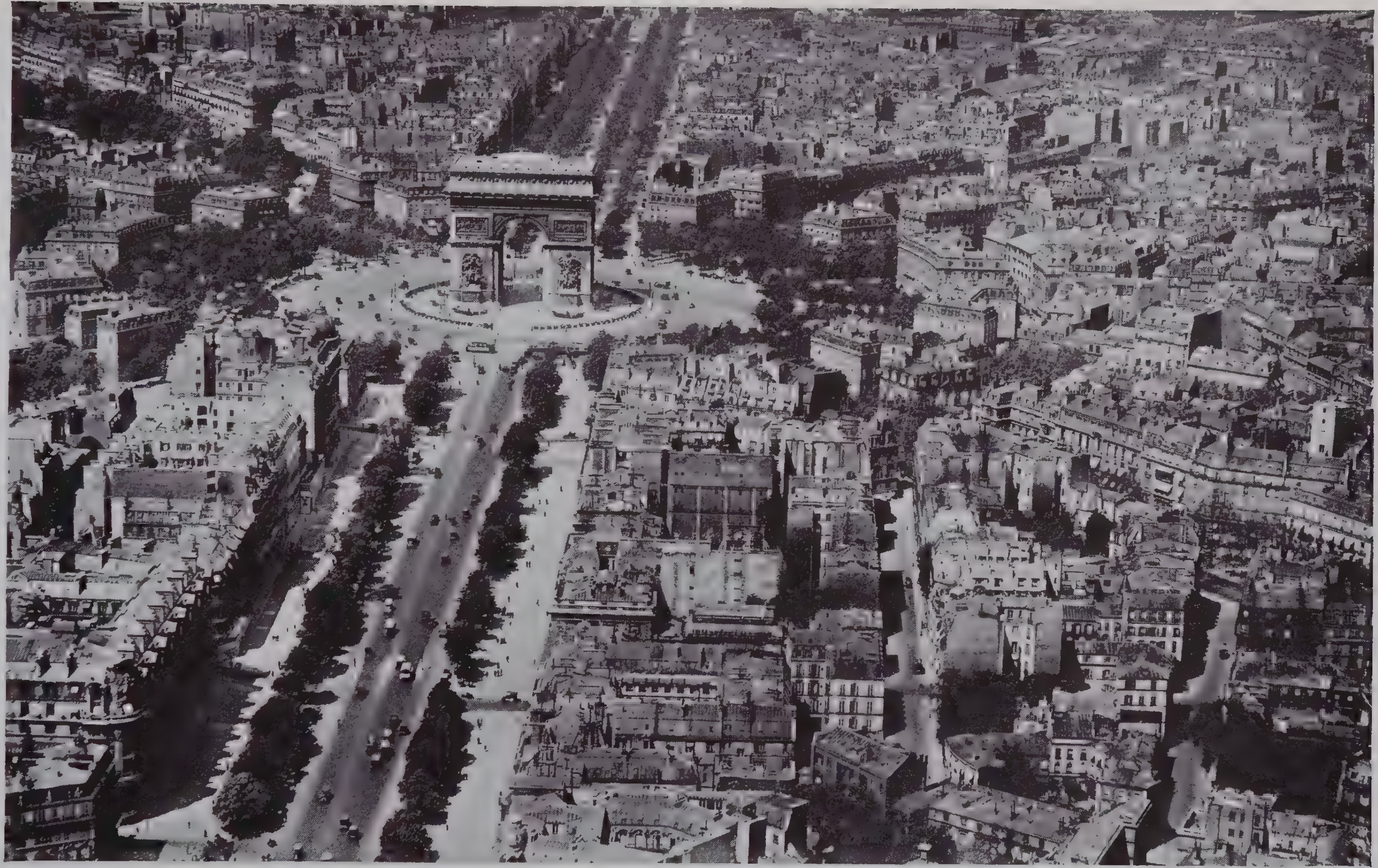
Looking down upon the Place de l'Opéra and the Opera itself, the airman beholds the very heart of "gay Paree." Entering the square from the lower left is the famous Rue de la Paix, which is the Mecca of the feminine heart of every land. Modistes, jewelers, and perfumers pay fabulous rents for the most modest quarters here and dispense their wares to an appreciative world. Flanking the square, but not on the Rue de la Paix itself, is the Café de la Paix, around whose sidewalk tables sit and gossip all the races of the earth.



Photograph by U. S. Army Air Service

THE ILE DE LA CITÉ AND THE CATHEDRAL OF NOTRE DAME: PARIS

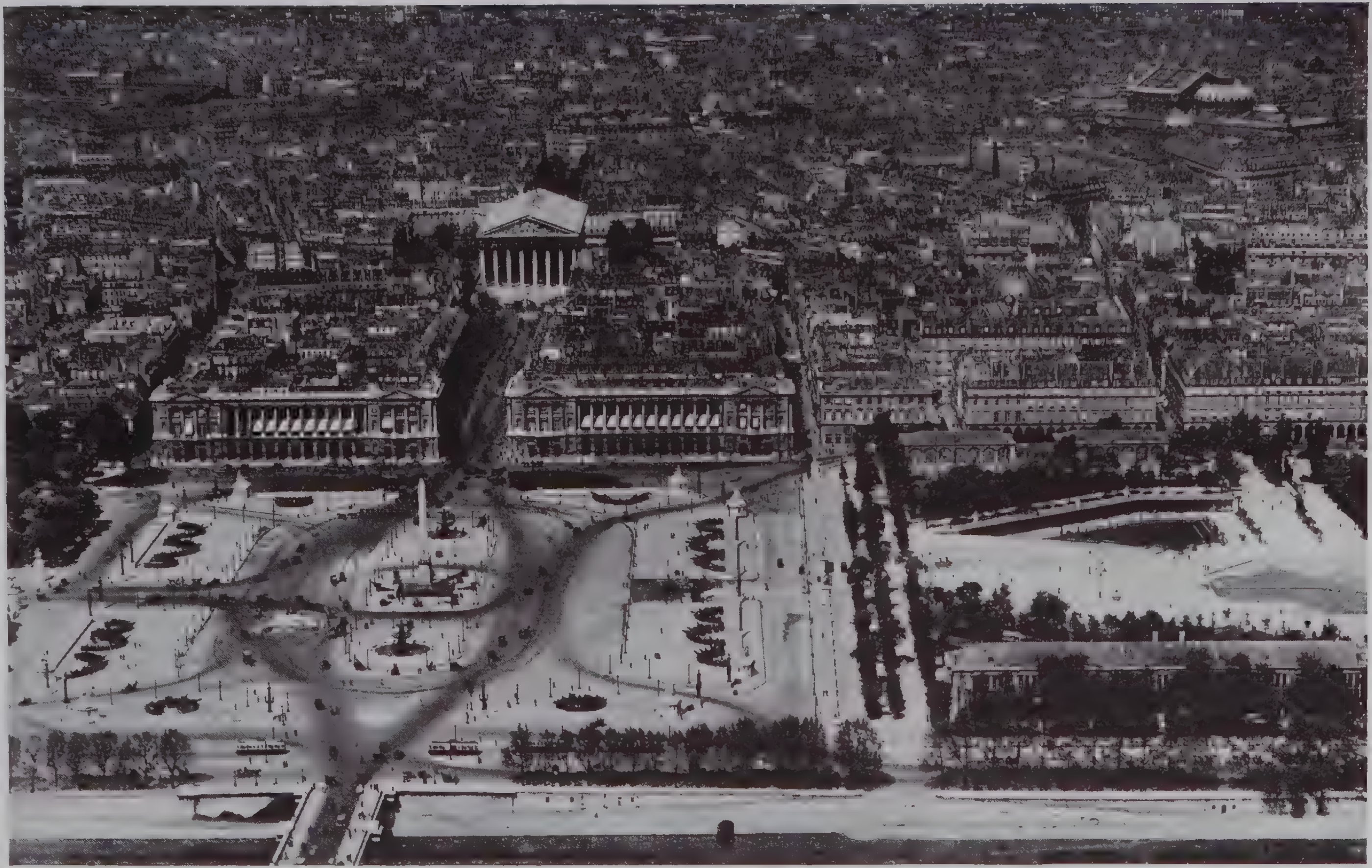
On this little island in the Seine was established the beginning of the French capital long before Cæsar's armies swept northward. Here was the Gallic town of Lutetia Parisiorum. For years this was the center of the city and the site of the royal palace. Now there are several public buildings here, but its principal object of interest is the Cathedral of Notre-Dame and the Sainte-Chapelle of the Palais de Justice, which was once the royal palace. Beyond is seen the Ile St. Louis, connected with the larger island by a bridge behind the cathedral.



Photograph by U. S. Army Air Service

THE CHAMPS ELYSÉES AND THE ARC DE TRIOMPHE: PARIS

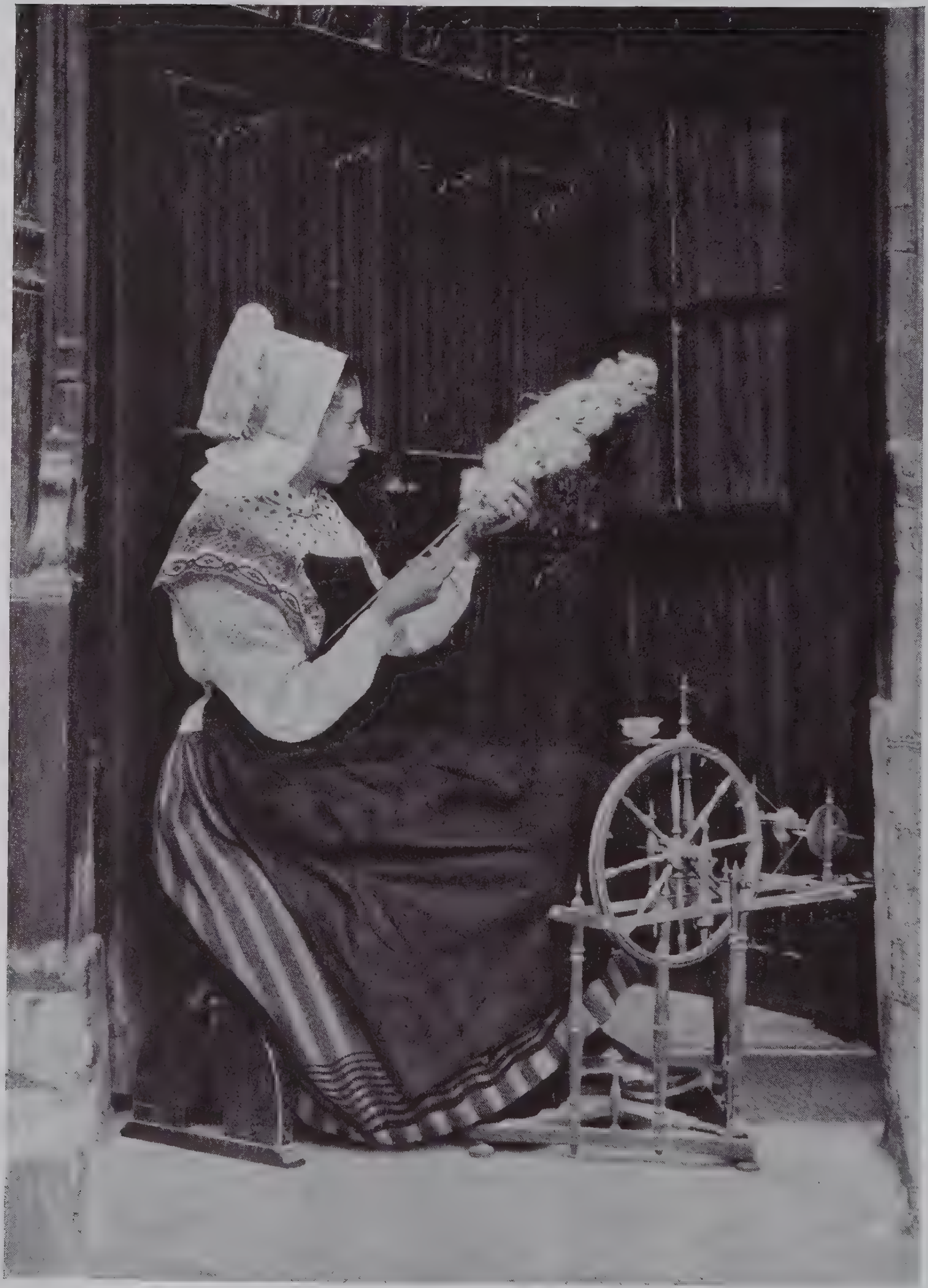
In the Place de l'Etoile, from which twelve wide avenues radiate, is Napoleon's triumphal arch, which he began in 1806 to commemorate his victories. The Champs Elysées is the matchless boulevard joining the Place de la Concorde and the Place de l'Etoile. Four sculptural groups decorate the pillars of the arch, and under the cornice are panels bearing the names of the principal Napoleonic victories. The Avenue de la Grande Armée, a continuation of the Champs Elysées beyond the arch, leads to the Bois de Boulogne and Neuilly, where stands the great hospital in which were located the wards maintained by members of the National Geographic Society during the World War.



Photograph by U. S. Army Air Service

THE PLACE DE LA CONCORDE AND THE MADELEINE: PARIS

The obelisk which rises in the center of the Place de la Concorde resembles the "Cleopatra's Needle," which stands in Central Park, New York. Around the edges of this great square are statuary groups representing eight principal cities of France. The Strasbourg group wore mourning for nearly 50 years, but is now decked with wreaths to celebrate the restoration of Alsace. Facing the square to the left is the Hotel Crillon, where the American delegates to the Peace Conference were quartered. The famous Madeleine, or Church of St. Mary Magdalene, with its Corinthian colonnade, stands out clearly in the picture, while the dome of the Opera may be seen at the upper right. The famous restaurant, Maxim's, is on the left of the street leading from the Place de la Concorde to the Madeleine.



Photograph by Creté, Ltd.

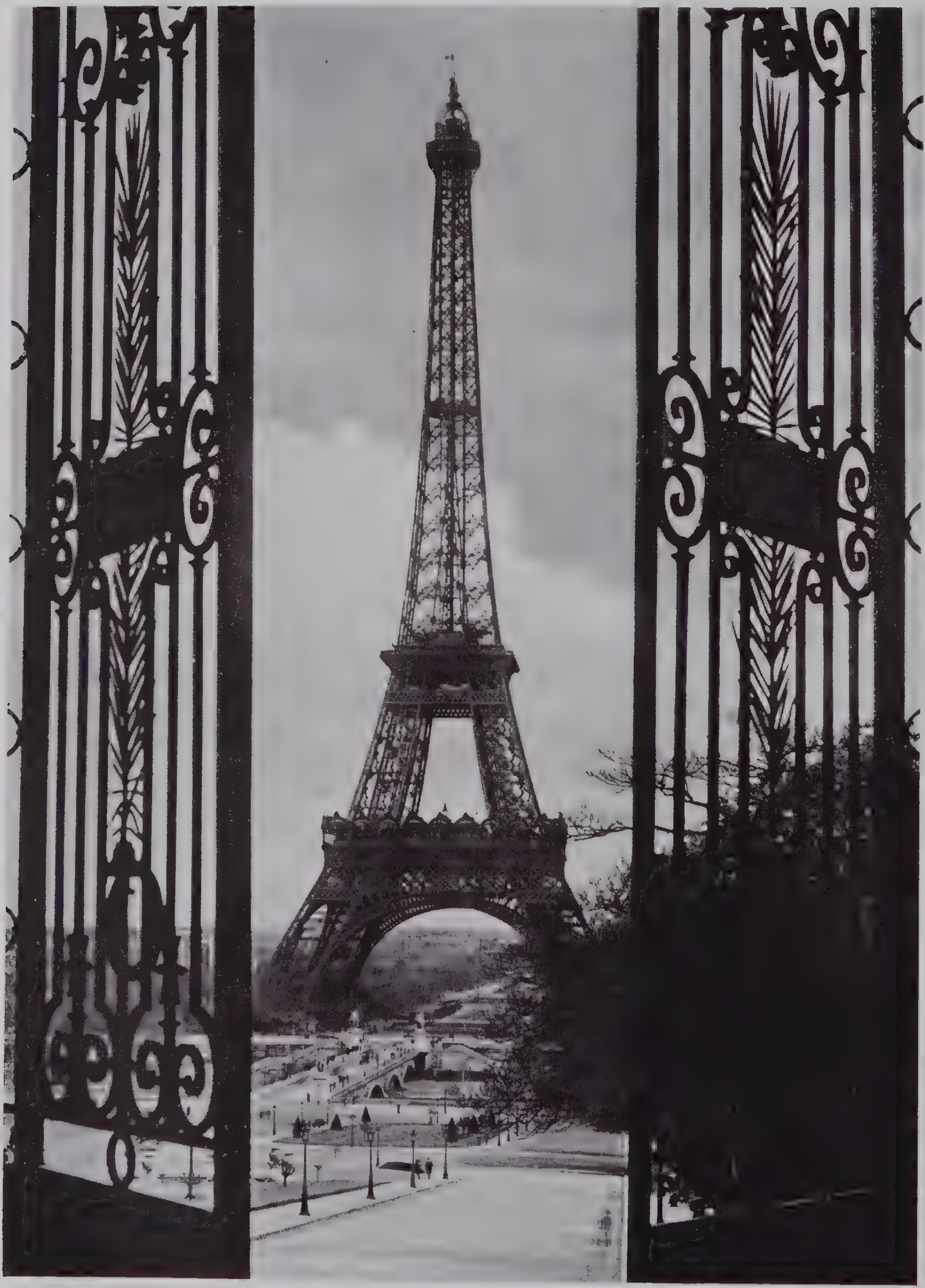
A PEASANT GIRL OF NORMANDY

The Norman is a model of industry and thrift, even in France, where the common people are noted for making the utmost of their resources. While the Norman farmer is at work in his fields, his wife and daughters are making butter, tending the poultry, weaving lace, or spinning wool. In out-of-the-way places the beautiful old Norman dress may still be seen.

Photograph by L. Boulanger

THE MEIJE, IN THE DAUPHINY ALPS

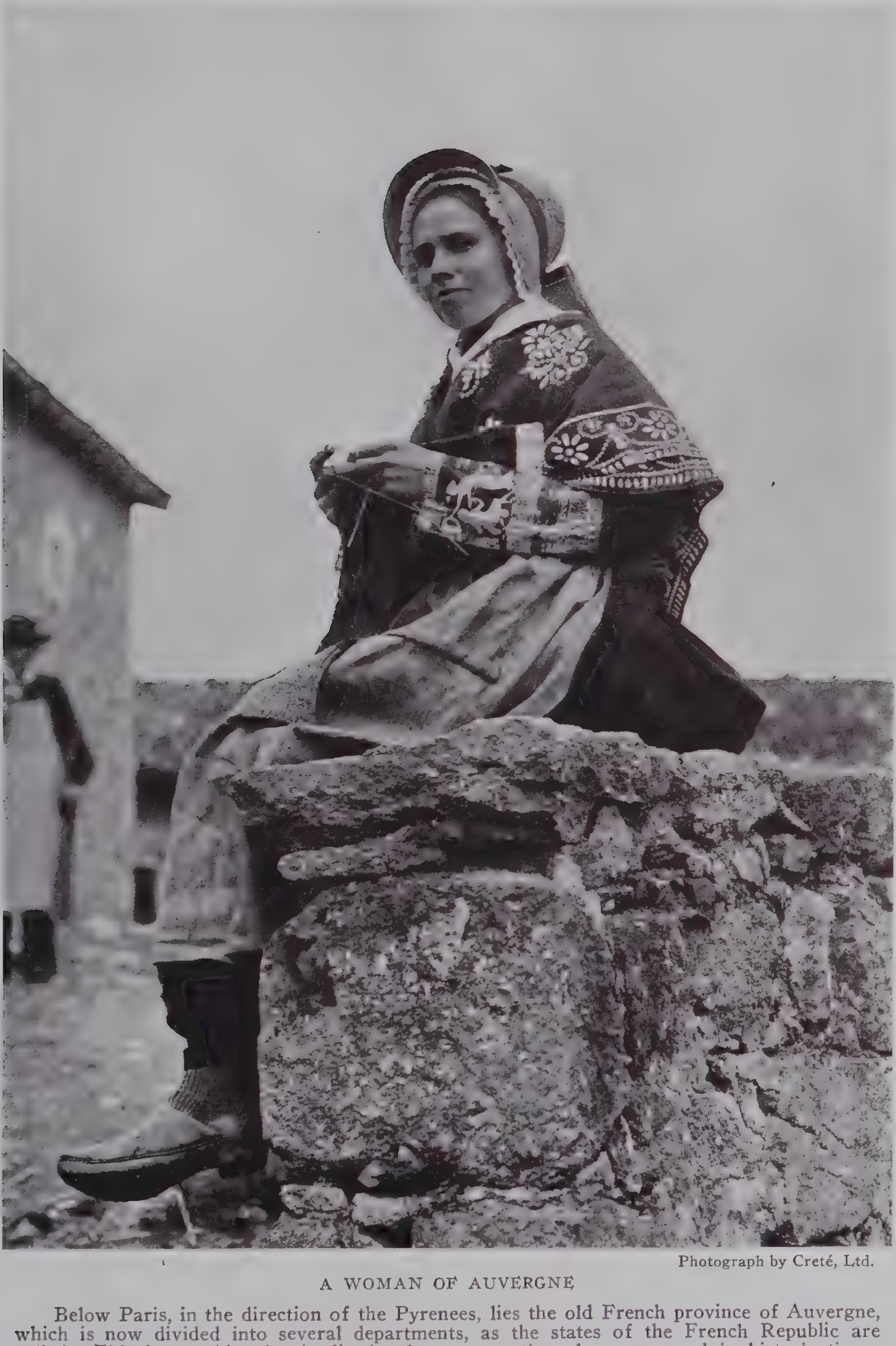
The scenery in this part of southeastern France, on the border of Italy, is sublime, though desolate, but is rendered accessible by modern engineering in the construction of good roads. This peak, by no means the highest, is one of the group of lofty summits lying entirely within French territory. Among mountaineers its ascent is noted for its difficulties, and to have climbed it is admission to exclusive mountain-climbing circles.



Photograph by Keystone View Company

MAN'S HIGHEST TOWER

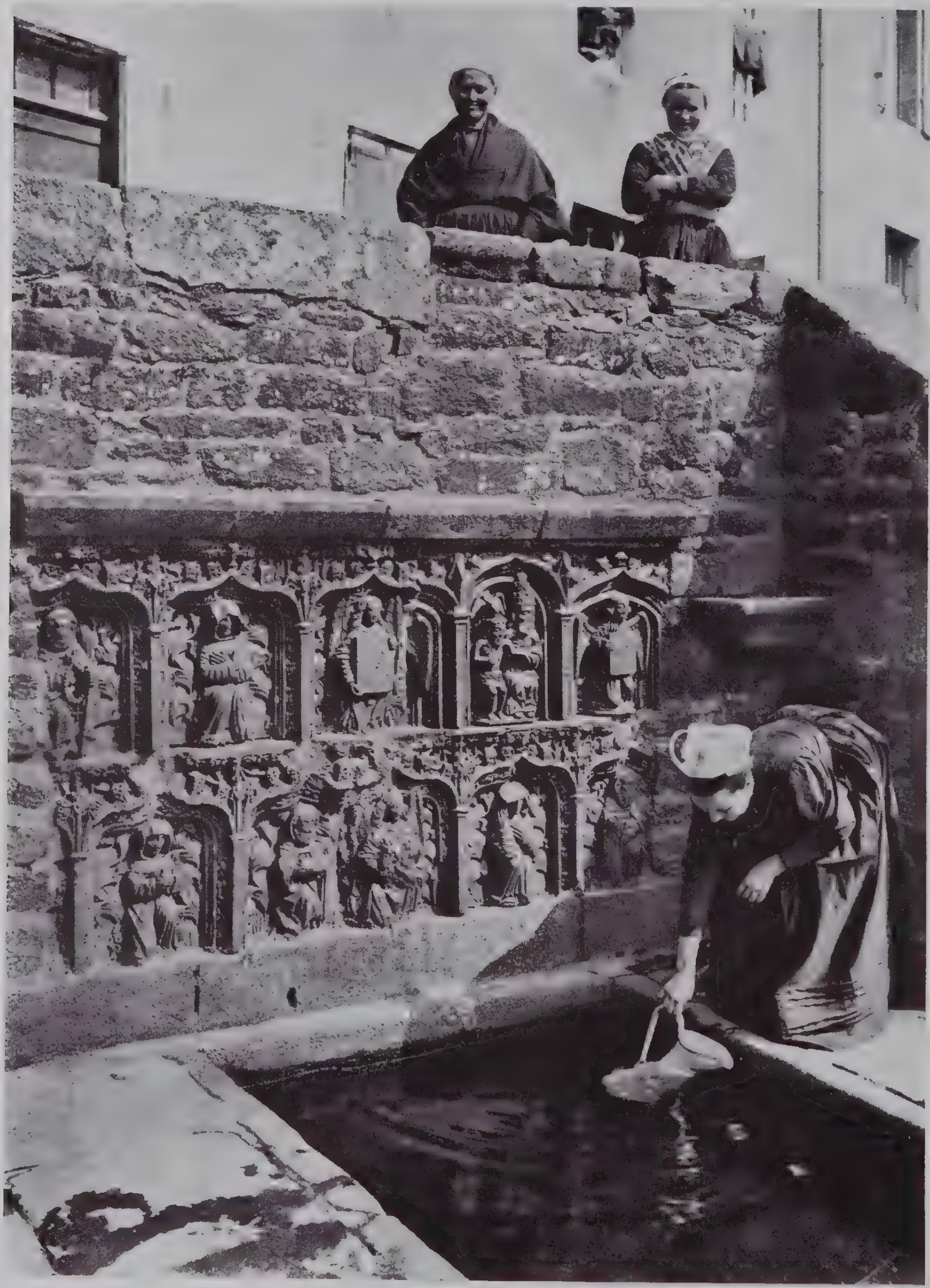
Like a great steel finger pointing toward heaven, the Eiffel Tower is to be seen from almost every point in Paris; but this view, through the doors of the Trocadéro, is most attractive. The height of this structure is just under a thousand feet, and of the several platforms the highest, where 800 people may gather, is 905 feet above the street. Above this there is a balcony, from which, on a clear day, one may see more than fifty miles. At the very top is a meteorological observatory and a wireless station.



Photograph by Creté, Ltd.

A WOMAN OF AUVERGNE

Below Paris, in the direction of the Pyrenees, lies the old French province of Auvergne, which is now divided into several departments, as the states of the French Republic are called. This is an old volcanic district, but no eruptions have occurred in historic times. The people resemble the Bretons of the north in their mode of living, but their costumes are quite different.



Photograph by Creté, Ltd.

ANOTHER REBEKAH AT THE WELL, THIS ONE A BRETON

This ancient and picturesque fountain in the little town of Landivisiau, Finistère, northern France, is named for St. Thivisiau, the patron of the locality. Unfortunately, the story of the carved stone panels which form its decoration has been lost in antiquity.

THE GEOGRAPHY OF JAPAN

With Special Reference to Its Influence on the Character of the Japanese People

By Walter Weston

Author of "Mountaineering and Exploration in the Japanese Alps" and "The Playground of the Far East"

THE islands of the Japanese Archipelago have been likened by the fertile fancy of its native geographers and poets to a garland of flowers or a girdle of jewels adorning the western margin of those far Eastern Seas. In prosaic fact, they really form the summit ridge of a stupendous mountain chain that rears itself from some of the profoundest ocean depths yet fathomed

The main features of this gigantic mass quite clearly prove its geological kinship with the Asiatic mainland. The long, sinuous crest of these mountain islands of Japan forms the advanced frontier of eastern Asia.*

The bed of the ocean between Korea and Japan, near the Tsushima Straits, is so shallow that a comparatively slight upheaval of it would afford dry-land communication from one to the other. In the extreme north, at the island of Sakhalin, the distance from the Asiatic mainland can readily be crossed in a small canoe.

This fact has an important bearing on the flora of the Japanese Alpine regions, for its peculiar admixture of Alpine and northern plant forms points to its transmigration from Kamchatka and eastern Siberia, carried thence southward by the violent monsoons and currents, and then driven up the mountains by valley winds.

MANY POINTS OF SIMILARITY BETWEEN JAPAN AND THE BRITISH ISLES

There are many striking and suggestive points of resemblance between the islands of Japan and those of Britain. Just as Britain was close enough to the Continent of Europe readily to receive its civilization and religion, while maintaining the independence characteristic of an island race, so it has been with Japan.

It is from the Asiatic mainland that Japan has derived all its ancient arts, religion, and civilization—chiefly from China, either direct or by way of Korea.

It is freely admitted by the Japanese that practically the only item of the amenities of life for which they have not been in the past indebted to the Celestial Empire is their love of cleanliness. Almost every Japanese, whenever possible, has a hot bath at the end of his day's toil, whereas the Chinese rarely, in any sense, gets into hot water (if he can possibly get out of it), and he is popularly said to observe sarcastically, "What a dirty fellow a Japanese must be to need washing so often!"

Both in area and population Japan proper somewhat exceeds the British Isles, having 150,000 square miles as against 121,000, and 57,000,000 inhabitants compared with 45,000,000.

ONE MILE OF COAST FOR EVERY NINE SQUARE MILES

These islands are remarkable for the length of their coast-lines, which, compared with the area, give a ratio of one mile of coast to nine square miles of land. The ratio in the case of the British Isles is one mile of coast to thirteen square miles. With this deeply indented coast-line, there are many good natural harbors, though these are mostly confined to the Pacific coast.

The shores abound in rich supplies of fish of many kinds, which have for centuries constituted one of the chief articles of the daily food of the Japanese people, and the fishing industries have served to rear a hardy race of seafaring folk.

Yokohama, the chief seaport of the Empire, lies in practically the same latitude as Gibraltar, while the central portion of the great range of the "Japanese

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*For a map of Japan, see the National Geographic Society's "Map of Asia" (size, 28 x 36 inches), published as a supplement with the May Geographic.

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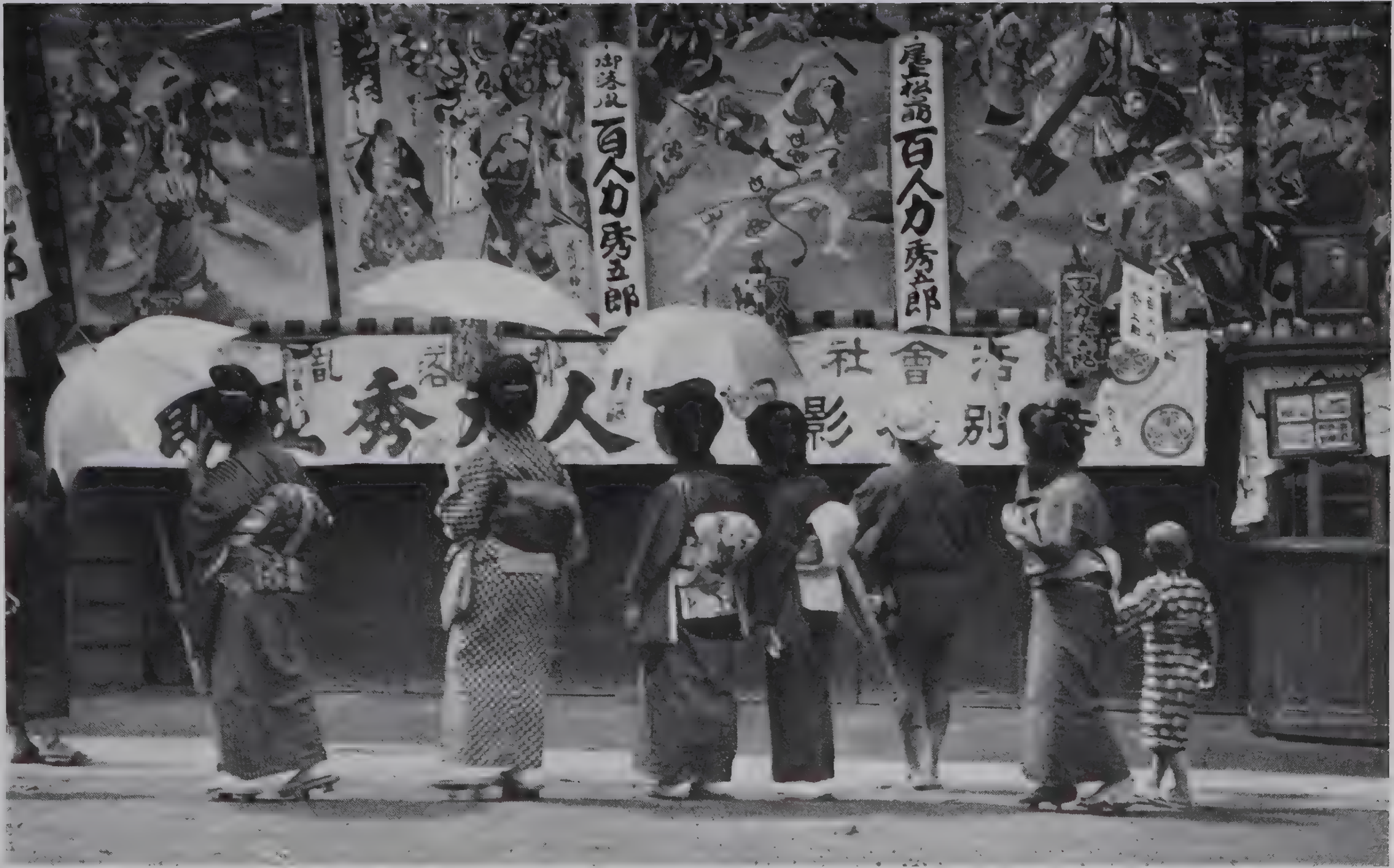
THE JAPANESE FARMER IS REALLY A GARDENER

In the land of Yoshihito, almost every plant is raised by hand, for there are five Japanese for every acre of land under cultivation. Only a small part of Japan is cultivable, the whole group of islands being very mountainous.


百人力秀五郎
百人力秀五郎

MAKING UP THEIR MINDS WHETHER OR NOT TO ATTEND THE "MOVIE" ADVERTISED BY THE POSTERS

The Japanese photoplay is melodramatic in its scope, and a would-be actor without a full equipment of swords and a white bandage with which to bind up his head would run little chance of posing for the camera.

Photograph from Walter Weston

A SNOW CREVASSE IN THE NORTH JAPANESE ALPS

Alps" corresponds in latitude and elevation with the Sierra Nevada of Spain.

AN AMAZING VARIETY OF SCENERY

The aspects of Nature in Japan, as in most volcanic countries, comprise an amazing variety of savage grandeur, appalling destructiveness, and almost heavenly beauty. From the mountains burst forth volcanic eruptions; from the land come tremblings; from the ocean sweeps in the dreaded tidal wave; over it rages the typhoon. Floods of rain in summer and autumn give rise to landslides and inundations. Along the coast the winds and currents are very variable. Sunken and emerging rocks line the shore.

All these make the dark side of Nature to cloud the imagination of man, and to arouse a nightmare of superstition in many untutored minds. Yet Nature's glory outshines her temporary gloom. The pomp of a luxurious vegetation, the splendor of the landscape, the clearness of the air, and the variety of the climate serve both to soothe and to enliven the spirits of man.

The majority of the inhabitants rarely see ice over an inch thick or snow more than 24 hours old. The surrounding ocean and the variable winds temper the climate in summer; the Kuro Shiwo, the "Gulf Stream" of the Pacific, modifies the cold of winter.

JAPANESE CHARACTER MOLDED BY ENVIRONMENT

These, then, are among the main influences of Nature in modifying and forming the physique and character of the people who inhabit Japan.

Add to the varied and violent contrasts the fact that the majority of the people dwell in houses mainly built of wood and paper, and therefore subject to sudden and complete destruction by fire, and we shall not be surprised to find them lively, impressionable, and artistic; but also, from the constant and imperative need of repairing the ravages wrought by these agencies, stoical, persevering, and withal, somewhat fatalistic.

The geographical features of Japan have much in common with those of ancient Hellas. In both there is the same combination of mountain, valley, and plain, a deeply indented coast-line, with its bays, peninsulas, and islands off the coast. Few places inland are far removed from the mountains, and not any are really distant from the sea. In each case the configuration of the country conduced to the formation of small communities, and to kindle the spirit of independence; for just as Greece was, in a political sense, not one country, but a multitude of independent states, often exceedingly small and always jealous of their individuality, so, until the immense changes wrought by the transformation during the last fifty or sixty years, of intercommunication between the inland provinces of feudal Japan and those on the coast, many of those provinces had their own types of people, with numerous distinguishing differences of appearance, dialect, customs, and characteristics.

Photograph from Walter Weston

HAVING A HOT BATH AT THE SHIRAHONE SPRINGS, AMONG THE JAPANESE ALPS

Japan is rich in the possession of more than a thousand hot springs, to which the peasantry resort in multitudes (see text, page 51).

JAPANESE PARALLELS IN ANCIENT GREECE

Satsuma, in the extreme south of Japan, in many ways resembled Sparta, with its Lacedæmonians, both in inaccessibility of geographical position and in the character of its inhabitants. Both were stern, dour, unliterary, and somewhat harsh to strangers.

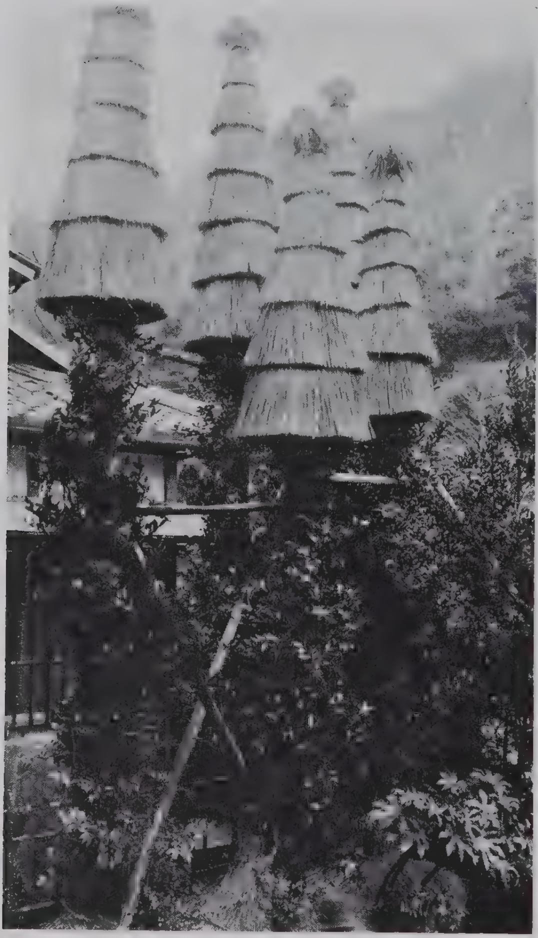
The dullness of the Bœotians finds its counterpart in that of some of the remoter peoples of the northern provinces of Japan; while Athens, intensely social, literary, and comparatively liberal in its intercourse with the outer world, has its own parallel in Kyoto, the old Japanese capital of the feudal days.

In the case of each country, the land was on all sides well protected, and yet also open to the sea; and in each case there was free access for commerce and civilization from early times, while the art of navigation was cultivated to an extent that bred a race of hardy and capable seafaring folk.

In each case the soil of the country, generally speaking, is only moderately fertile—a fact conducing to the industry and comparative frugality of the majority of its inhabitants.

It is as true of the Japanese today as of the Greeks of old, that a study of their natural surroundings affords a clue to their history.

When, as Mr. Freshfield writes in



Photograph by A. Nielen

JAPAN DRESSES HER TREES FOR WINTER

These jackets, or hoods of straw, are put over the tender tree-tops in autumn to protect them against frost.

"Mountains and Mankind," we see how the Greeks "seized eagerly on any striking piece of hill scenery and connected it with a legend or a shrine"; how "they took their highest mountain — broad-backed Olympus—for the home of the gods"; and how "they found in the cliffs of Delphi a dwelling for their greatest oracle and a center for their patriotism"—when one remembers all this, one has but to substitute such names as that of the far loftier "peerless peak" of Fuji-san (Fuji-yama), or of Ontake, up to whose sacred summit-shrine the white-robed pilgrims toil by thousands, in sunshine and in storm, to worship; or of those still holier fanes in far-off Ise in Yamato, where only the Emperor himself or his chosen representative may enter, on behalf of his people, to hold converse with the spirits of the "Divine Ancestors," in order to see how close a resemblance exists between the influence of similar physical surroundings on two peoples endowed with the like characteristics of a lively, artistic, and impressionable nature.

Had Pausanias been able to pursue an itinerary in the Land of the Rising Sun similar to that which he followed in his "Description of Greece," he would have furnished us with pictures of scenery and observation of the folk-lore and legends of Japan that would, in a hundred separate instances, have been equally true of either of these beautiful lands.

MORE STRIKING CLIMATIC CONTRASTS THAN IN ANY OTHER LAND

The climatic conditions of Japan offer contrasts of a more striking character than any other country of similar area in the world. While in the northernmost island we have mainly subarctic features, in the southernmost we find them subtropical. Moreover, on the west coast of the main island we find both those extremes represented in the same region.

The cold, dry northwesterly winds of winter that sweep across from Siberia gather up the moisture over the Japan Sea and deposit it in a snowfall often heavy enough to bury whole villages. Intercommunication between house and house is then maintained only by means of sheltered arcades, and buildings of importance need to be identified by sign-posts stuck in the snow to indicate the "Post-office is below," "The police station will be found underneath this spot." Nevertheless, in the same region the summer is almost tropical in character.

Photograph by A. Nielen

LIKE CLOTHES ON A LINE, THE JAPANESE HANG THEIR CORN OUT TO DRY

This method of ripening and curing grain is necessary in some districts on account of excessive rains and the short summer season.

Again, while the western side of the great mountain mass of these regions exhibits leaden skies and biting winds, on the east, toward the Pacific coast, the winter is nearly always delightfully bright and sunny and snowfalls are seldom seen.

AN AVERAGE OF FOUR EARTHQUAKES A DAY

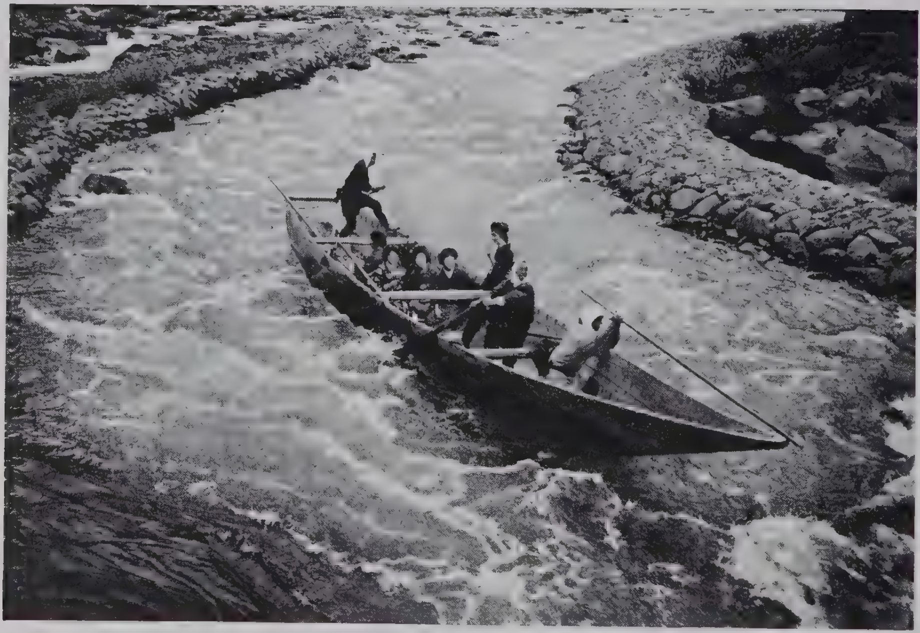
One of the most disturbing features (in every sense) of the natural phenomena of Japan is the frequency of earthquakes. There is an average of four a day, but shocks of a very serious kind only occur once in six or seven years. The consolation is that if they came less frequently they would be more disastrous in their results.

The greatest center of activity is on the Pacific coast, near the Bay of Tokyo, and it is here also that the tidal waves are most destructive. Sometimes the loss of life from the combined agencies has amounted to over 27,000. As many as a quarter of a million houses have been destroyed at once. Active volcanoes, however, provide a safety-valve for the disquieting forces at work below the earth's crust, and consequently the regions where these are found are seldom harmed by seismic shocks.

Typhoons (or cyclones), unlike the earthquakes, can be counted upon with much more certainty, and invariably and appropriately usher in the break up of the summer heat, during the second week in September, though occasionally they appear at other times. This may be counted upon as an absolutely regular fixture. Their effects are usually more destructive on the coast, and occasionally one may find vessels of considerable size deposited high and dry in the back street of a large seaport town.

PEASANTS DELIGHT IN HOT SPRINGS

There are more than 1,000 mineral springs to be found in the mountain regions of Japan, and in the more secluded spots they form a feature of peculiar interest. They constitute a great asset to the peasantry in those regions, who resort to them by the thousands, for the sake of health or to kill time pleasantly in the company of their friends. Whatever else may be thought of the alleged fickleness of the Japanese character, it is certain that their love for hot water has never grown cold.



SHOOTING RAPIDS IN JAPAN

Mountain chains which extend throughout the principal islands form a watershed which makes all the rivers of the empire short and in the main swift and of little value as commerce-carriers. They present opportunities for hydro-electric development, however.

Photographs by Kiyoshi Sakamoto

FISHERS DRAWING A NET ON THE BEACH

Japan has a mile of seacoast for every nine square miles of area, as compared with Great Britain's mile to every thirteen square miles.

Photograph by Graham Romeyn Taylor

A BILL-BOARD ADVERTISING WAKANAURA, A POPULAR SEASIDE RESORT NEAR OSAKA

Not only are the Japanese railways clever advertisers, but neat bill-boards at most of the stations show the direction and distance of all places of interest from the local station.

Of one of the most noted sulphur springs it is maintained that all ailments are curable there with the exception of the disease of love!

While in some places one now finds separate compartments reserved for those who prefer to bathe more privately, it is usual in the more primitive places for both sexes to do so together promiscuously. There is here no longer found the dividing cord stretched across the big tank to denote "This side for ladies, that for gentlemen," which at one time, in some of the larger towns, was employed out of consideration for the feelings of "foreigners" on the subject. All is conducted with complete decorum and propriety.

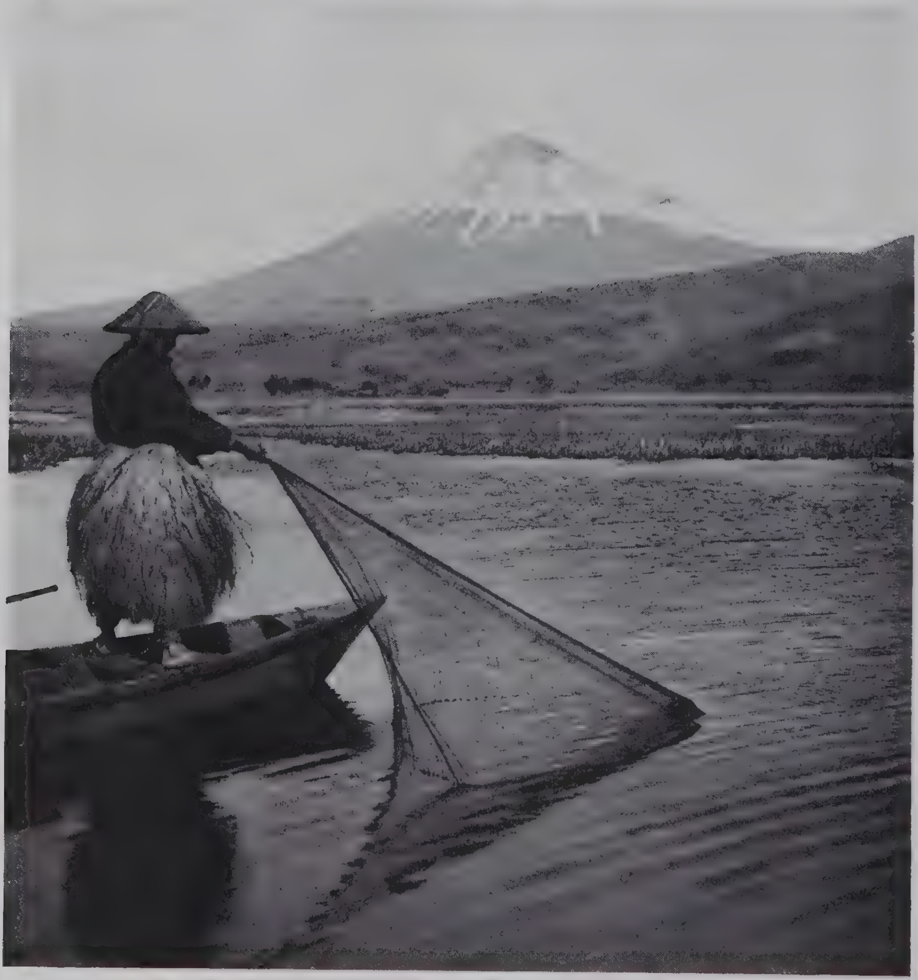
HALF THE VARIETIES OF THE WORLD'S FLORA FOUND IN JAPAN

It is the abundant supply of moisture in every form that is largely responsible for some of the most striking and important features of the Japanese landscape—for a flora that includes half the known varieties of the earth's vegetation in an area only a little larger than that of the British Isles.

We have also to note the countless deeply cleft valleys, whose torrents find their way from high mountain ranges to the sea by narrow channels. After a storm or the melting of the snows of winter, these streams are swollen into broad, resistless floods, whose deltas open out into the ocean half a mile or more in width.

Large tracts of land are thus held in perpetual desolation, though the skill and energy of native engineers are developing methods and resources of riparian progress of growing value. Their efforts are gradually superseding the ancient ways.

Formerly the River God was honored with a handsome shrine, to which the peasantry resorted in the springtime for services of supplication in order to avert the likely destruction of their unprotected rice fields and mulberry plantations by the dreaded storms of early autumn, when the rice harvest was ripening. To-day, one of the chief festivals of such a shrine is that observed in Kofu, capital



Photograph by Kiyoshi Sakamoto

MT. FUJI SEEN FROM LAKE FUJI (SEE ALSO PAGES 81 AND 84)

This, the highest and most beautiful mountain of Japan, is a volcanic cone rising from a sea-level plain to an altitude of 12,400 feet. It is snow-capped at all seasons of the year. The fisherman is wearing a grass raincoat, which covers his shoulders during a shower, but is thrust down to his hips while he is working.

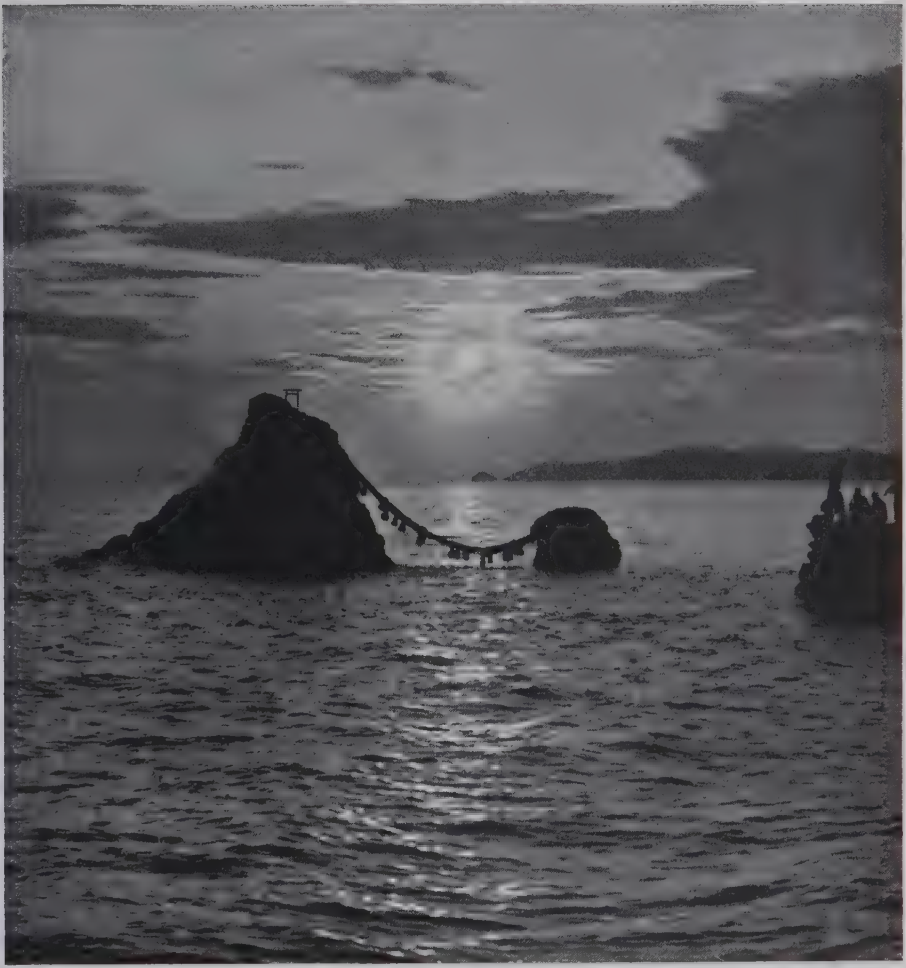
of the prefecture of Yamanashi and commercially one of the most progressive inland cities of the Empire!

A LAND OF UNSURPASSED WATERFALLS

In the beauty and variety of its myriad waterfalls Japan is unequaled. As types of these one may select the famous cascade of Kegon at Nikko and the broad fall of Shiraito, near the foot of Fuji-san.

Kegon forms the outlet of the famous mountain volcanic lake of Chuzenji, in the heart of the region known, from its entrancing loveliness, as Nikko, the "Splendor of the Sun." It falls in an unbroken column of water into its rocky basin 350 feet below. It was noted some years ago as the popular spot for suicide in the case of students disappointed in love or in examinations (see page 80).

Shiraito, on the other hand, forms a broad series of cascades, falling over a semicircular cliff at the foot of the most beautiful mountain in Japan. The pop-



Photograph by Kiyoshi Sakamoto

SUNRISE AT FUTAMI

The "Meoto Iwa," or "Man and Wife Rocks," at Futami are connected with a "shimenawa," or sacred rope. The Japanese worship the rocks as symbols of the God of Happiness or Marriage; hence a *torii,* or shrine-gate, on top of the larger rock.

ular description of this lovely cataract is that the two larger and the 39 smaller falls composing it are the parents and children of a family of 41 members (see illustration on page 81).

The appeal that the countless and varied natural beauties of the scenery of Japan makes to its people, both educated and unlearned, is impossible to realize or to describe, except from personal observation. It exercises a profound and universal influence on the imagination of both rich and poor, whether dwelling in crowded cities or on the countryside.

EACH GREAT MOUNTAIN HAS ITS DIVINITY

Wherever any spot of unusual loveliness is found, there rises the appropriate shrine in its honor and there is the need of admiration or adoration offered to its *genius loci.*

Each great mountain has it tutelary divinity, who may be worshiped with fear and trembling for the aversion of

A HUNTER WORSHIPING ON THE SUMMIT OF YARI-GA-TAKE

Next to Fuji, Yari-ga-take (Spear Peak) is the highest mountain in Japan. On every hand its granite spires are streaked with snow at most seasons of the year.

Photographs from Walter Weston

MOUNTAIN PILGRIMS IN A JAPANESE ALPINE VALLEY

These worshipers are bound for the shrine on the summit of the sacred mountain of Ontake. Each mountain has its particular divinity.

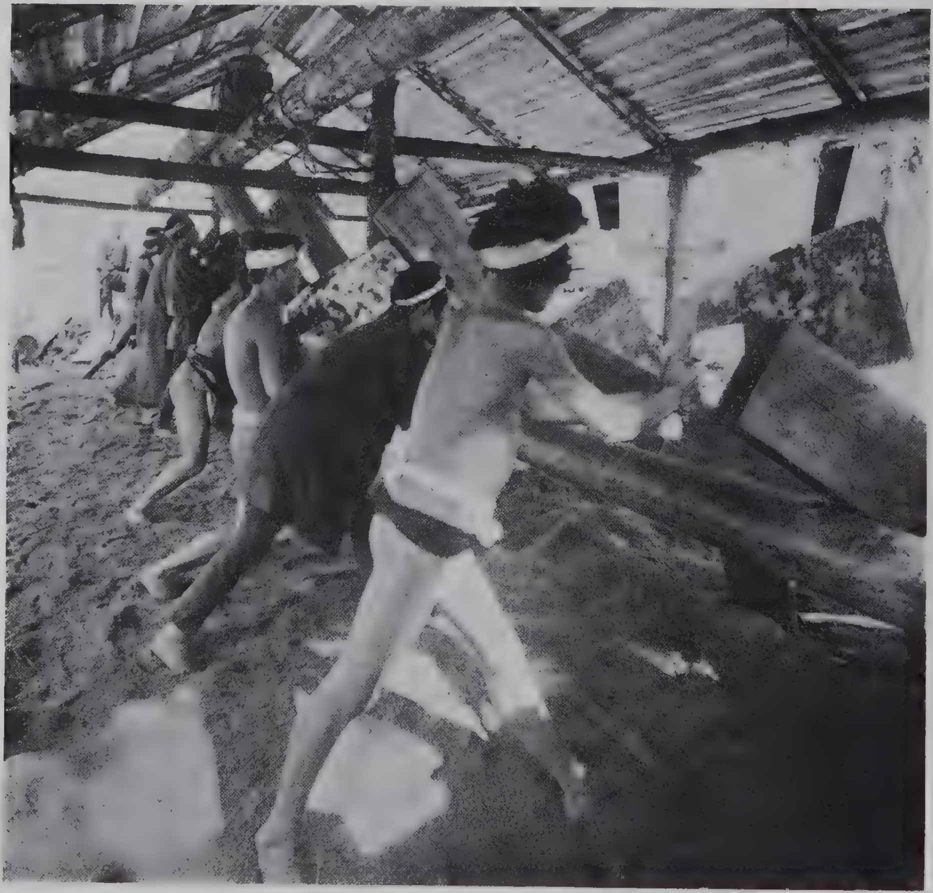
A NEWSGIRL WITH A BABY ON HER BACK, ON THE STREETS OF THE JAPANESE CAPITAL

Little girls of ten or twelve go about their work with doll-like babies strapped to their backs, and one often sees them playing hop-scotch while the head of a sleeping infant bobs about in time to the steps.

Photograph by Kiyoshi Sakamoto

YOUNG JAPAN PLAYING AN OLD GAME

Although military caps are most popular with children, the traditions of the two-sworded gentry, the Samurai, are kept alive by actors and motion pictures.



Photograph from J. R. Joy

A JAPANESE SAWMILL

Although Japan has more than three times as much area in forests as in land that is under cultivation, most of the lumber used in the island empire is sawn by hand. Water-power is intermittent along the short rivers, and the use of modern machinery is largely restricted to the coast cities. Even with rising wages, the sawmill does not largely compete with the man-power mill.

the evil his volcanic fires can work, or, in the case of other stately peaks, for the help he can bestow. Indeed, no description of the physical features of the chief mountain systems of Japan would be justly attempted which did not emphasize the actual psychological effects which result from the close contact of a lively and impressionable people with the splendid and varied peaks which overshadow their homes.

As in Greece, so in Japan, the most characteristic feature of the land is its mountains. They spread over the whole country and form a chief part of every view. They have constantly modified the course of historical events, and especially of military operations.

They have served, by limiting facility of intercourse, to conserve the special and peculiar features of the inhabitants of each corner of the land which they shut off from all the rest; for, in spite of the increase of railway communication in the plains, the strongly marked characteristics of many of the different provinces or districts are quite noticeable, even in the present days of transformation, where the mountain barriers hem them in

It is the hard conditions of life in

© Keystone View Company

REELING SILK IN ONE OF JAPAN'S MANY MODERN MILLS

More than one-fourth of the world's silk is produced in Japan. Of this a large percentage is sold as raw silk and only about one-sixth of the entire amount is manufactured in Japan.

those wild and inhospitable regions that long ago engendered those habits of frugality, endurance, and self-reliance among an island race immune from invasion, and have rendered the Japanese one of the proudest and most self-satisfied patriots the world has ever seen.

MORE THAN HALF THE PEOPLE LIVE ON THE LAND

No less than three-quarters of Japan is mountain land, to a great extent uncultivated, because uncultivable. The remaining quarter is worked with a minuteness of care and an intensity of energy of which we have little conception and to which none of our industries offers any parallel.

In spite of the growth of industrialism and the migration of so many from the countryside to the towns, still more than half the people live "on the land." Even in feudal Japan, the tillers of the soil ranked next in social status to the Samurai and above the merchants and mechanics. Those were days when Japan was secluded from the world and was forced to be self-supporting. In order to make the most of her resources, all available ground was laid under contribution

A story is told of a farmer who terraced his own little hillside in no less than eleven tiers. At length he sat down to survey the results, but to his dismay he could see only ten terraces below him. The eleventh was invisible; he was sitting on it!

THE EFFECT OF MOUNTAINS ON THE JAPANESE

It is, then, in the subjugation of the soil that the Japanese people (the peasantry, old and young, number more than 25,000,000) develop so much of their unwearying patience, perseverance, and cheerfulness. Moreover, it is among the soldiers recruited from among the hillmen that some of the finest campaigners are found.

During the Russo-Japanese War in Manchuria it was found that in districts where long marches over a route chiefly leading along goat paths or across trackless gullies and crags, each man having to find his own way and rejoin his company on the farther side, the native mountaineering habits of the lower ranks invariably enabled them to select the most accessible line of country.

From what I have already said, I hope I have made it clear that there is an intimate connection between the physical features of Japan and the psychological characteristics of the Japanese. A brief notice of the mountains in particular will help to illustrate their influence on the inhabitants.

Through each of the chief islands of Japan there runs a solid backbone of mountains, which, taken together, constitute three great mountain systems.

The first, or northern, of these is known as the Russian, or Karafuto, system. Karafuto is the Japanese name for Sakhalin and means the "Wave-land," in allusion to its mountainous character. Passing through Karafuto, it traverses Hokkaido (Yezo) and reappears in the mainland, which it penetrates to its center in the provinces of Kōshū, Shinshū, and Suruga.

The second, or southern, is known as the Chinese, or Kuenlun, system. This originates in the Kuenlun Mountains of the central Asian plateau and runs across central China by way of the Peling range, to reappear in the southern islands of Japan, Kyūshū and Shikoku. This system is then continued until it meets the northern, or Karafuto, system in the broadest and central part of the mainland. It is here that the profoundest valleys are cleft and the mountain summits rise to their loftiest heights in the varied and picturesque ranges known as the "Japanese Alps."

The conflict of these two systems has resulted in terrific upheavals, and then, like a mighty wedge driven in between them, there runs a vast transverse fissure, crossing the mainland of Japan at its broadest span, from the Sea of Japan to the Pacific Ocean. It is known as the Fossa Magna, or the Fuji belt, and throughout its entire length a line of erupted volcanoes has burst forth, stretching across the whole width of the island and passing southward through the beautiful hills of the famous Hakone district into the Pacific Ocean in "The Seven Islands of Idzu."

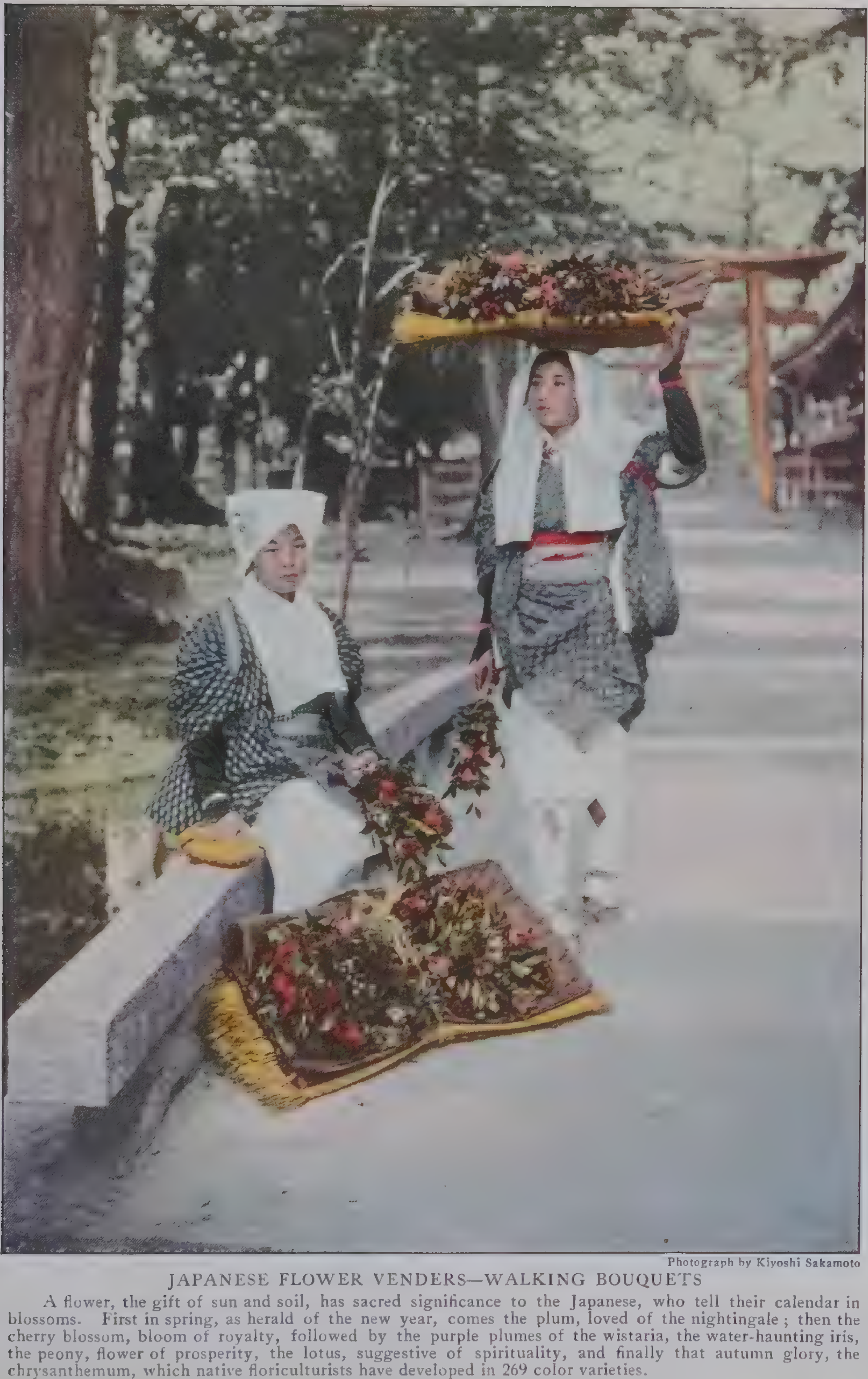
As a result of the mingling of these different ranges, we have that extraordinary variety of form and structure which gives to Japanese mountain landscape its most romantic and characteristic charm.

Mighty volcanoes, extinct, quiescent, or active, alternate with great battlements and spires of granite, or with sharp-pointed, isolated monoliths of harder rock.

VISCOUNT BRYCE'S TRIBUTE TO JAPANESE MOUNTAINS

With this variety of outline we find vivid examples of those other factors to which the scenery owes so much—the extreme variations of temperature, the abundance of moisture, and the erosive power of the mountain torrents; and if to these we add the effect of a clear sky and brilliant sunshine during a considerable portion of the year, particularly in spring and autumn, we have the secret of that extraordinary charm of landscape of which Viscount Bryce recently wrote, that "there is probably no other country that exhibits such an endless variety of natural beauty in the shapes of the mountains and in the rich luxuriance of the trees and flowers."

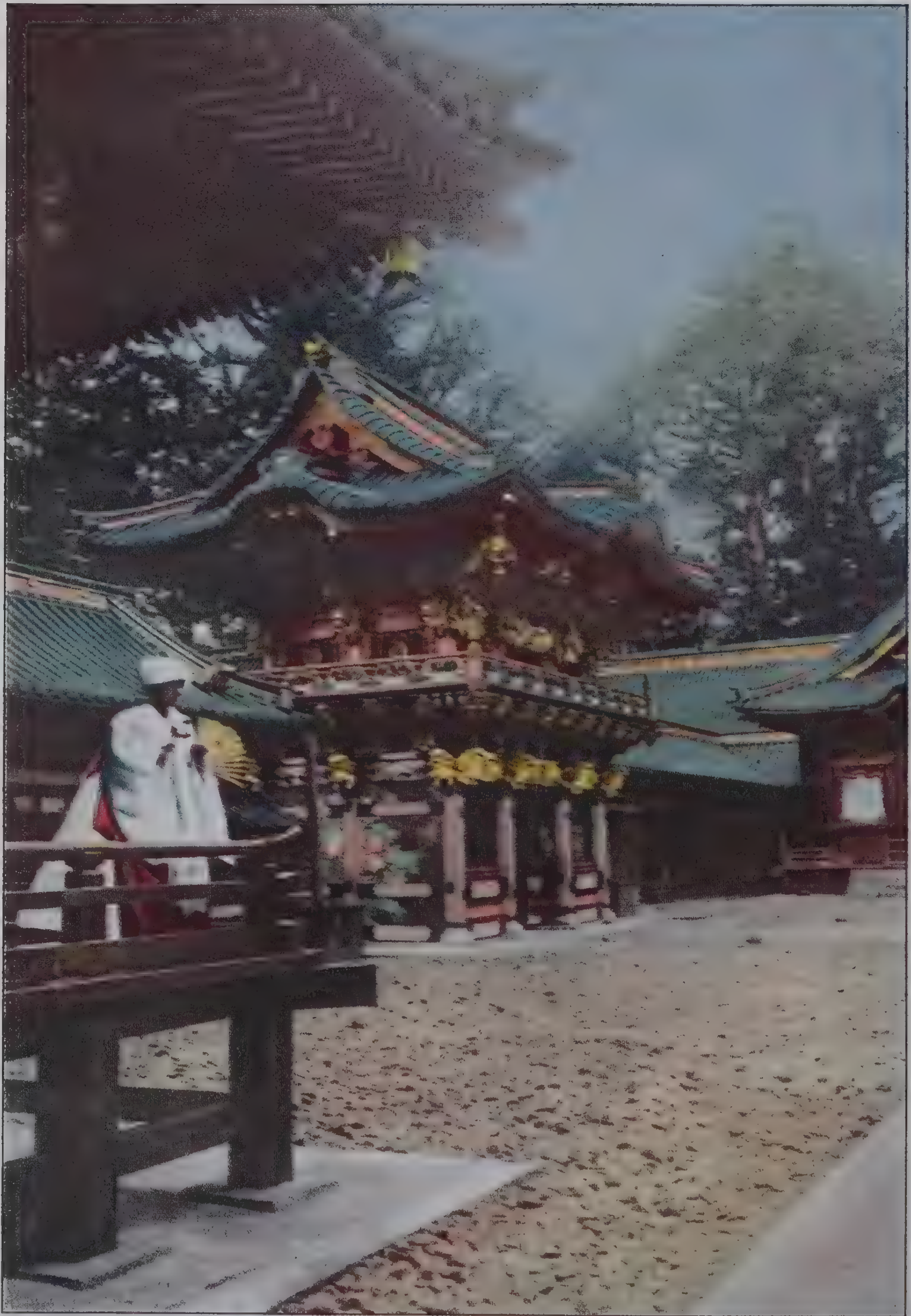
There is no established evidence as to traces of glacial action yet found in the great Alpine ranges of central Japan.



Photograph by Kiyoshi Sakamoto

JAPANESE FLOWER VENDERS—WALKING BOUQUETS

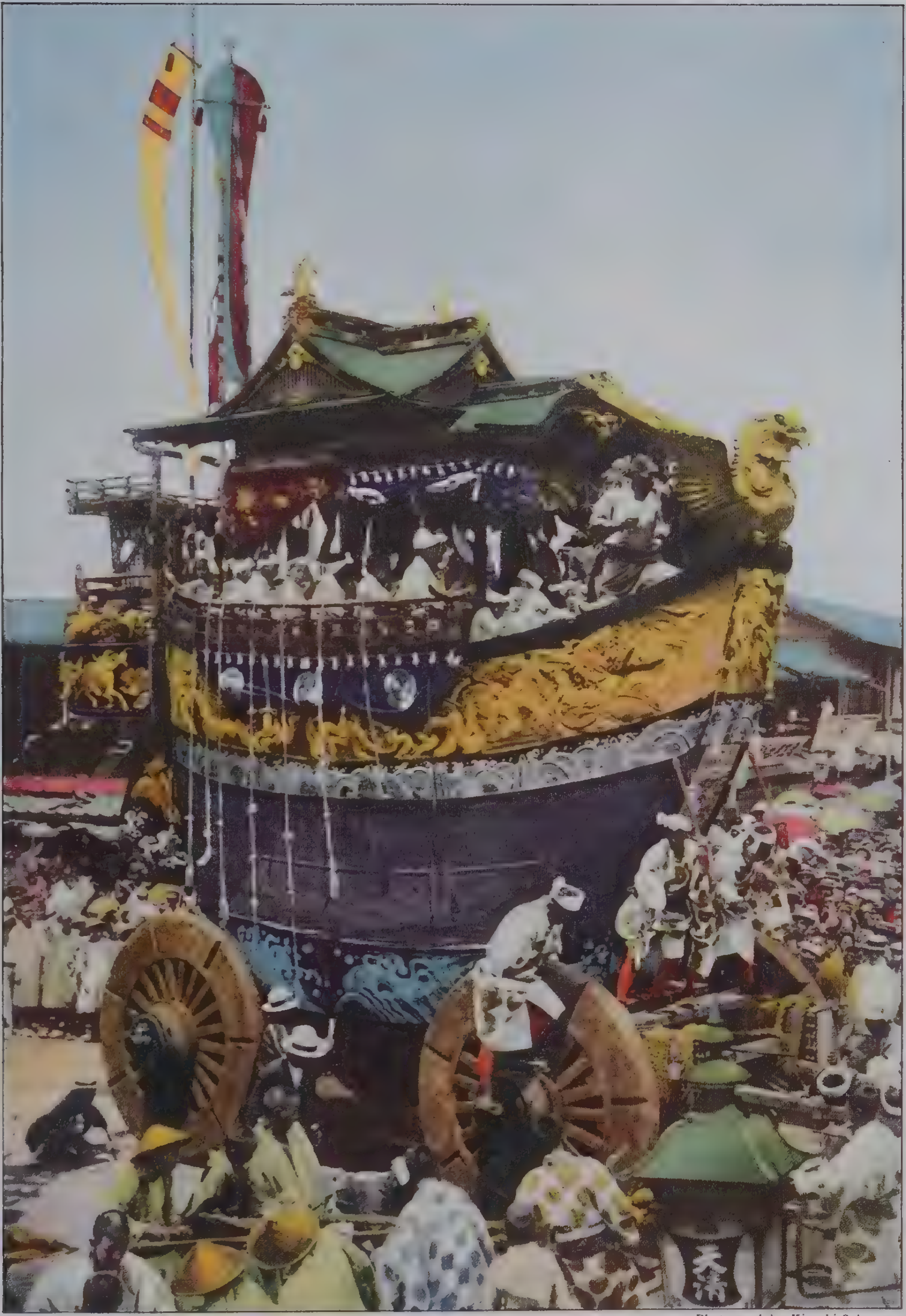
A flower, the gift of sun and soil, has sacred significance to the Japanese, who tell their calendar in blossoms. First in spring, as herald of the new year, comes the plum, loved of the nightingale; then the cherry blossom, bloom of royalty, followed by the purple plumes of the wistaria, the water-haunting iris, the peony, flower of prosperity, the lotus, suggestive of spirituality, and finally that autumn glory, the chrysanthemum, which native floriculturists have developed in 269 color varieties.



Photograph from David M. Robertson

"THE MORNING TILL NIGHT GATE" OF THE IYEYASU TEMPLE, AT NIKKO

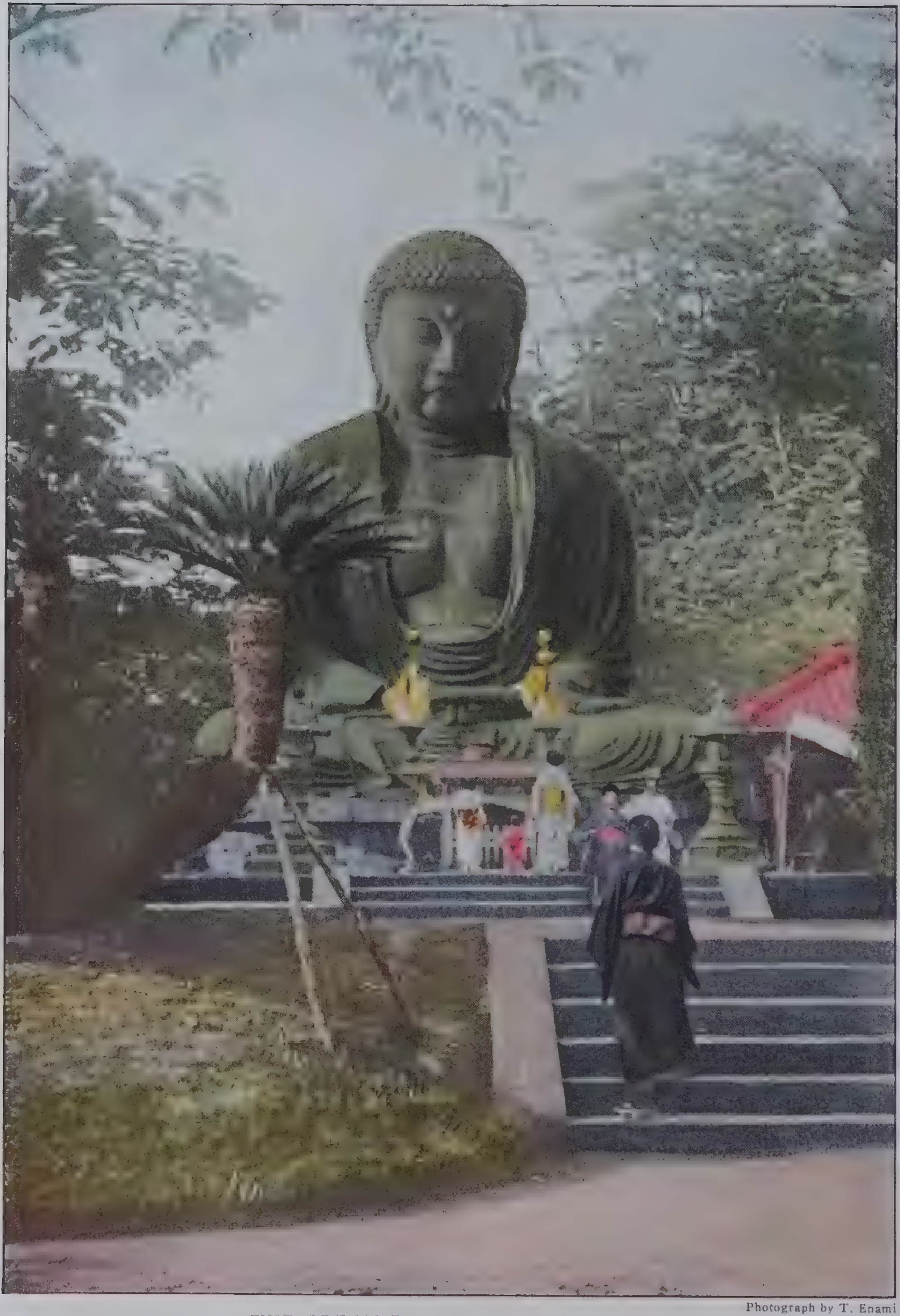
"On the declivity of the Holy Mountain of Nikko, under cover of a dense forest and in the midst of cascades whose roar among the shadows of the cedars never ceases, is a series of enchanting temples made of bronze and lacquer with roofs of gold."—Pierre Loti. There is a Japanese proverb which says, "He who has not beheld Nikko has no right to make use of the word *splendor*."



Photograph by Kiyoshi Sakamoto

A FESTIVAL CAR IN THE STREETS OF KYOTO

The third city of Japan is famous for its beauty contests among the geishas, and for its street processions, in which towering cars of ornate design, laden with merry-makers in multihued garments, are a spectacular feature. The celebrants do not manifest their greatest pleasure by noisy demonstrations, but by silence.



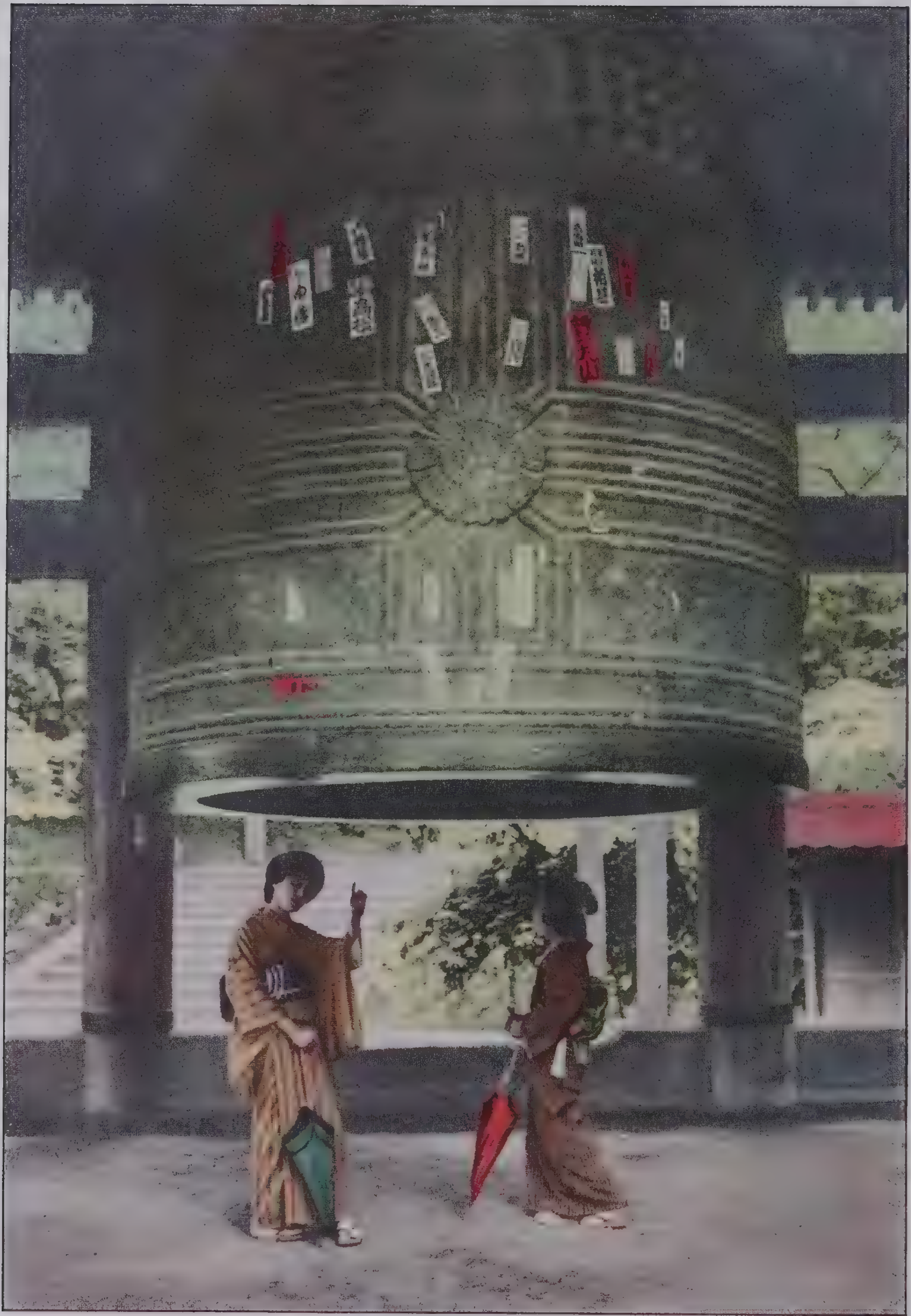
Photograph by T. Enami

THE GREAT BUDDHA OF KAMAKURA

The site of a vanished capital, Kamakura is said to have sheltered more than 700,000 souls in the heyday of its glory. Today, it is a humble fishing village, having as its sole claim to fame this great bronze Daibutsu, the seated Buddha, with eyes of pure gold and massive boss of silver on its forehead.

A JAPANESE FARMER GIRL

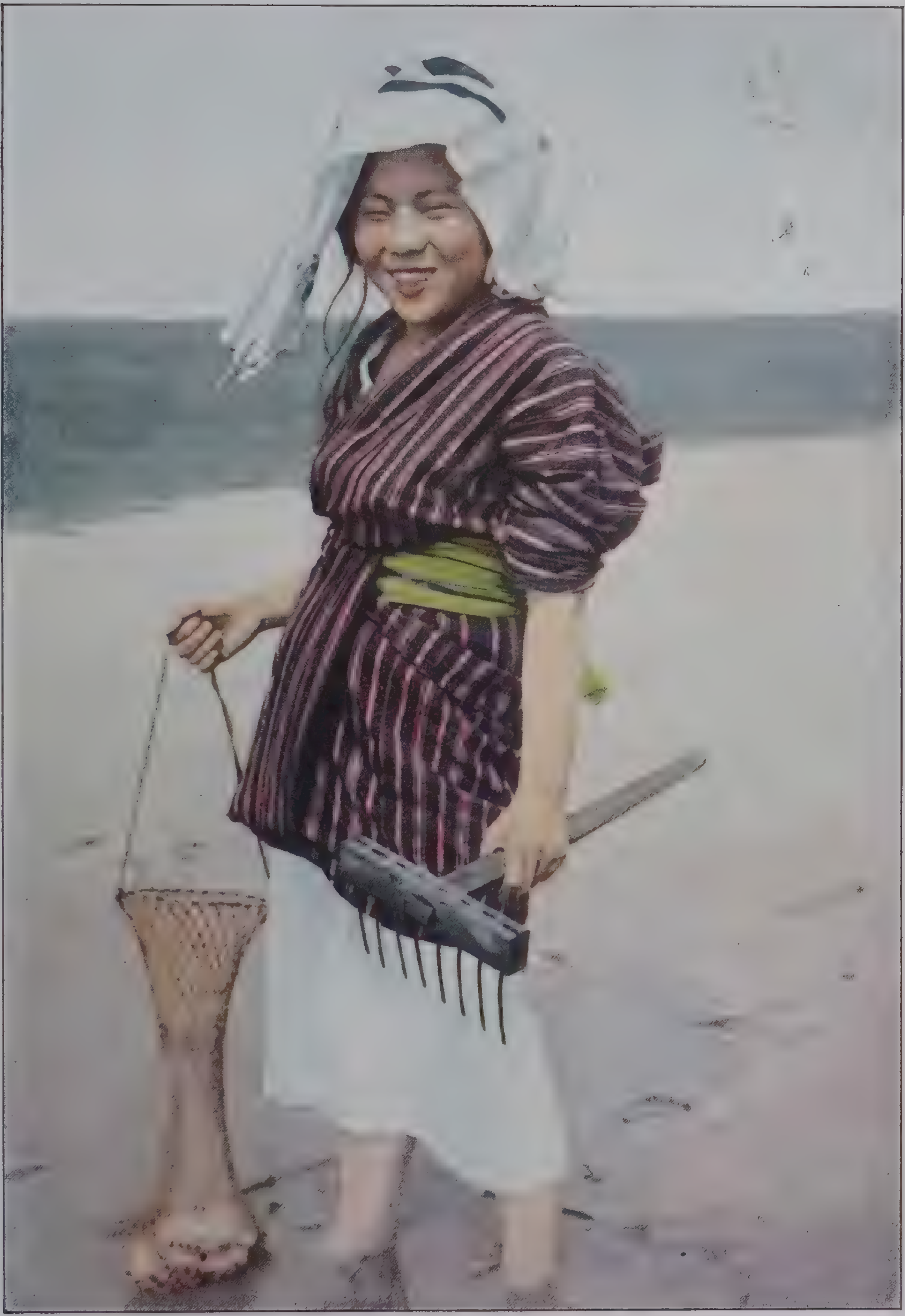
There are five and one-half million farm households in Japan, and their fields, which seldom exceed two and one-half acres in extent, resemble neatly planted gardens in miniature, so precious is every inch of ground. Man, woman and child lend a hand at cultivating and harvesting.



Photograph by Kiyoshi Sakamoto

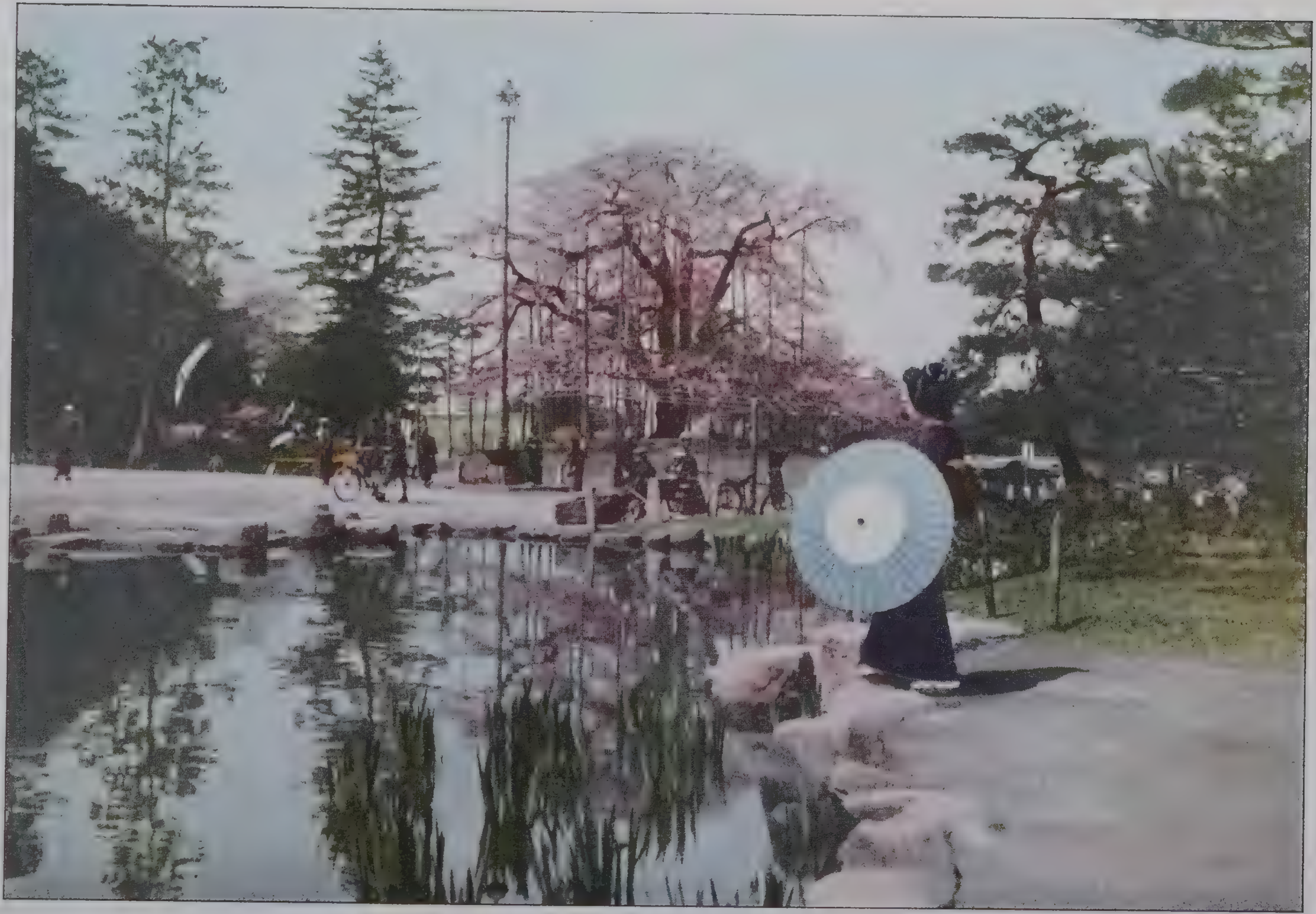
THE GREAT BELL OF THE CHION-IN TEMPLE IN KYOTO

At the height of the flower season, in April, when all Japan is in festive mood, the air of Kyoto is flooded with the melodic peals from this deep-throated bell. At a distance in the stillness of the dawn, one cannot tell whence come its soft reverberations.



THE CLAM DIGGER LIKES HER WORK

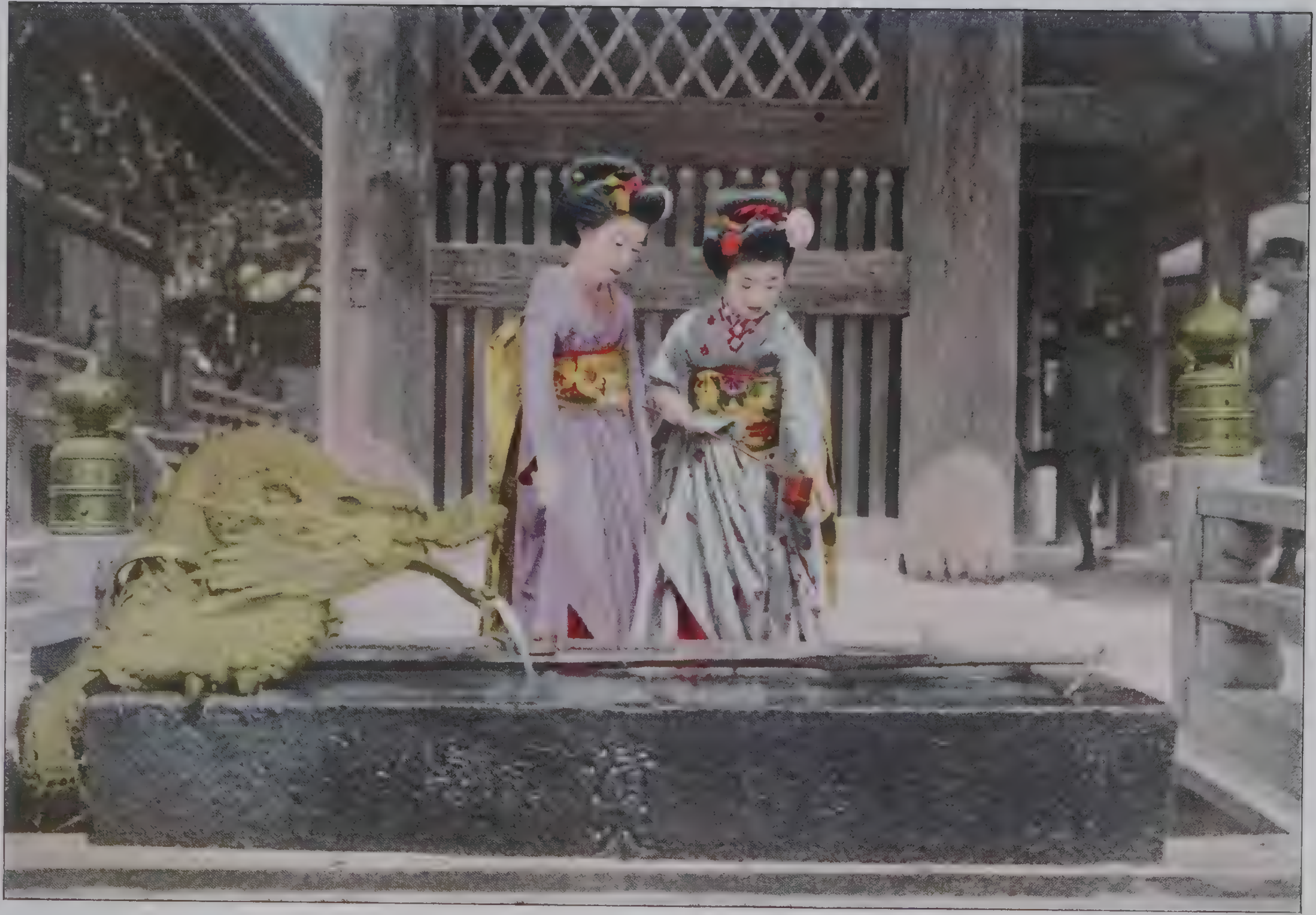
Two and one-half million people of Japan look to the sea for a livelihood, and there are more than 400,000 fishing craft which ply the surrounding waters. Fishermen's widows and orphans abound in every seaside village, for the storm takes an annual toll of a thousand seafarers in small boats.



Photograph by Kiyoshi Sakamoto

CHERRY BLOSSOM TIME IN KYOTO, MARUYAMA PARK

One of the chief attractions of this popular resort of the people of Kyoto, which was the capital of Japan for more than a thousand years, is a large cherry tree with drooping branches. Here at night, in the latter part of April, thousands gather to see the blossoms by torchlight.



Photograph by Kiyoshi Sakamoto

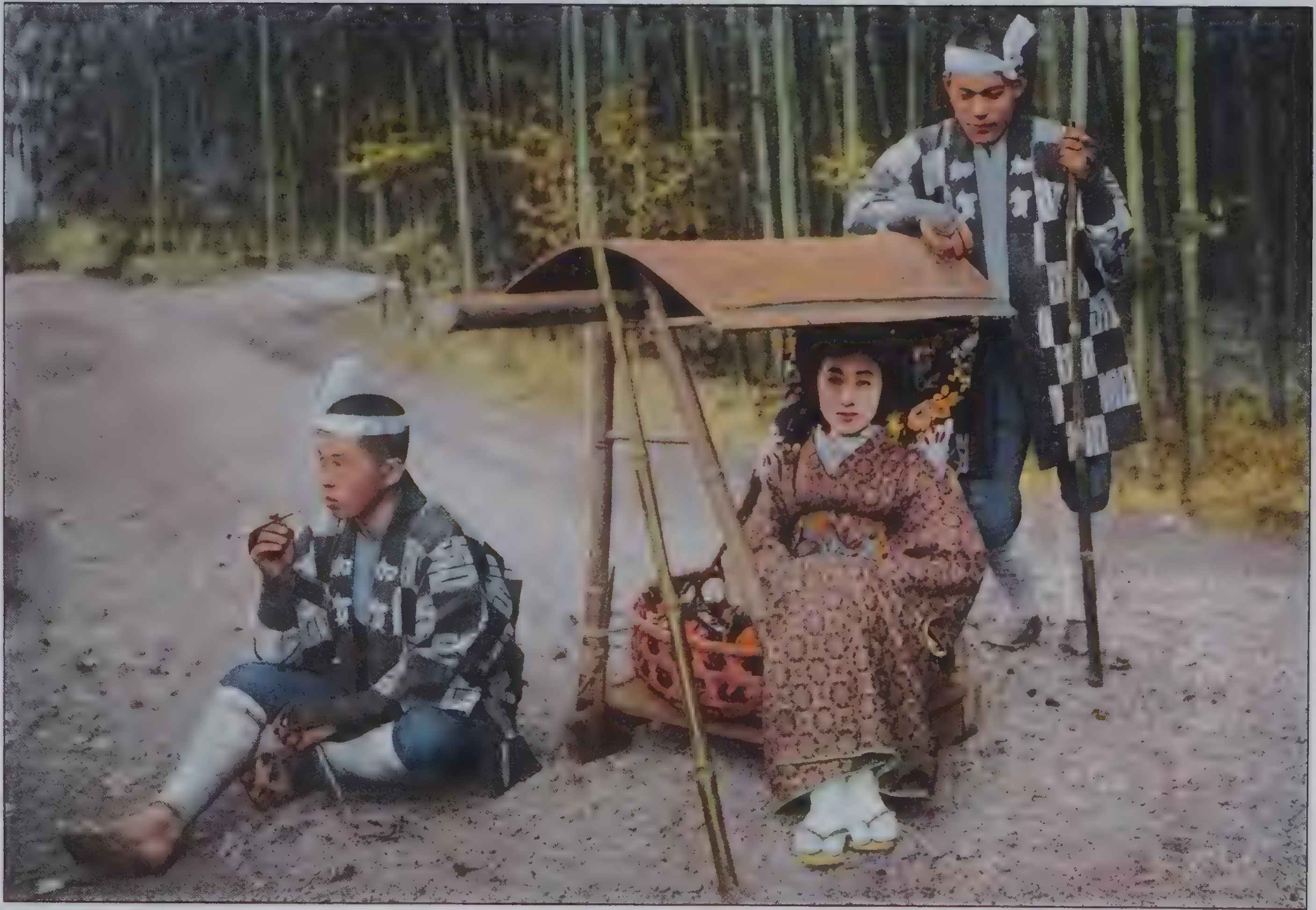
JAPANESE GIRLS LAVING THEIR HANDS BEFORE WORSHIPING IN THE KIYOMIDZU-DERA, KYOTO

This temple is dedicated to Kwan-on, the Japanese god whose famous image has eleven heads and a thousand hands. The original buildings, erected many centuries ago, were destroyed by fire and only the image of Kwan-on was saved.

Photograph by Kiyoshi Sakamoto

GATHERING IRISES IN A JAPANESE GARDEN

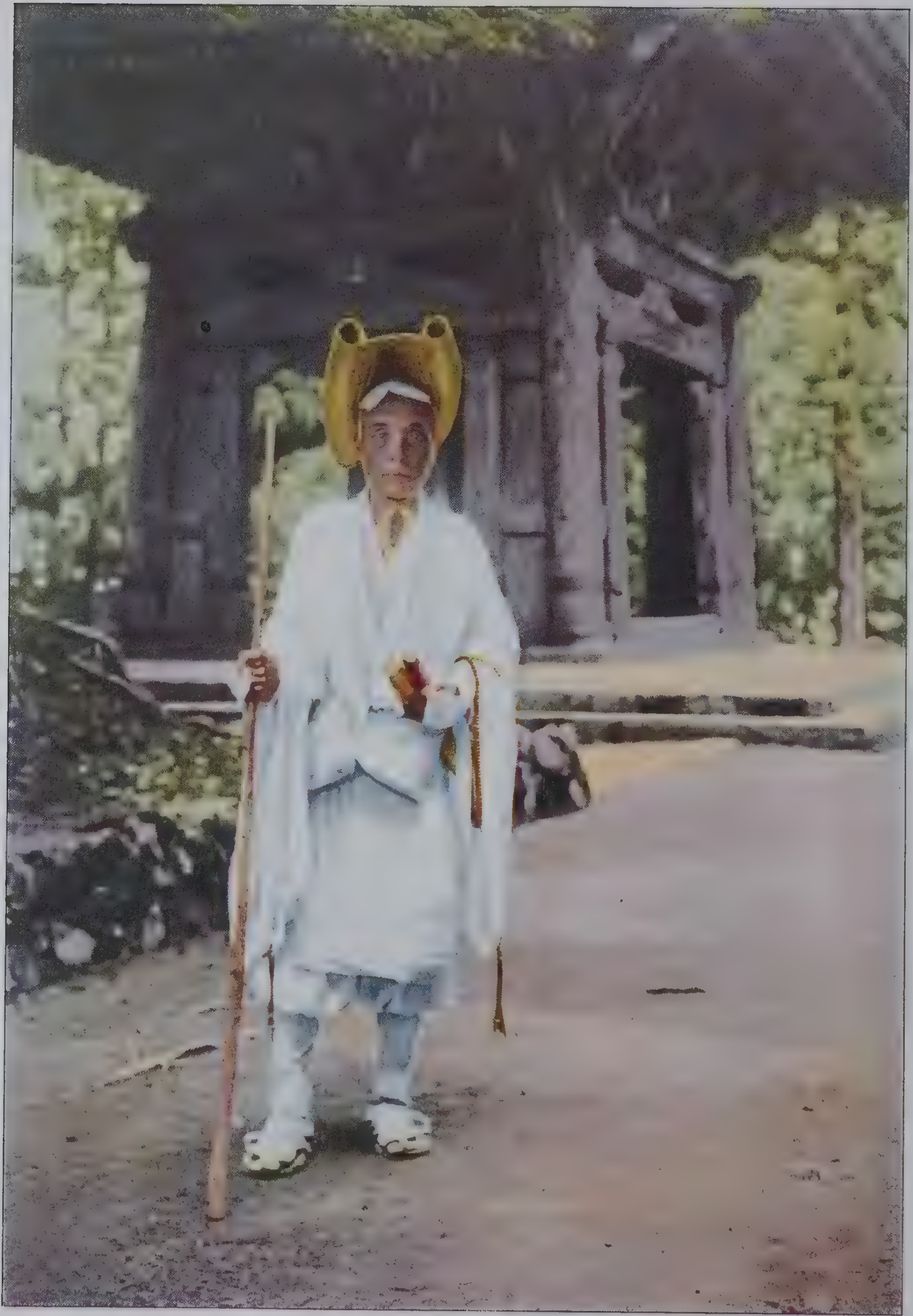
A week in June is set aside for the iris fêtes. Among the most famous iris gardens of the Land of the Rising Sun are those in Hori Kiri, where acres of these fleurs-de-lis form a marvelous carpet of varicolored blossoms.



Photograph by Kiyoshi Sakamoto

A JAPANESE LADY AND HER PALANQUIN BEARERS

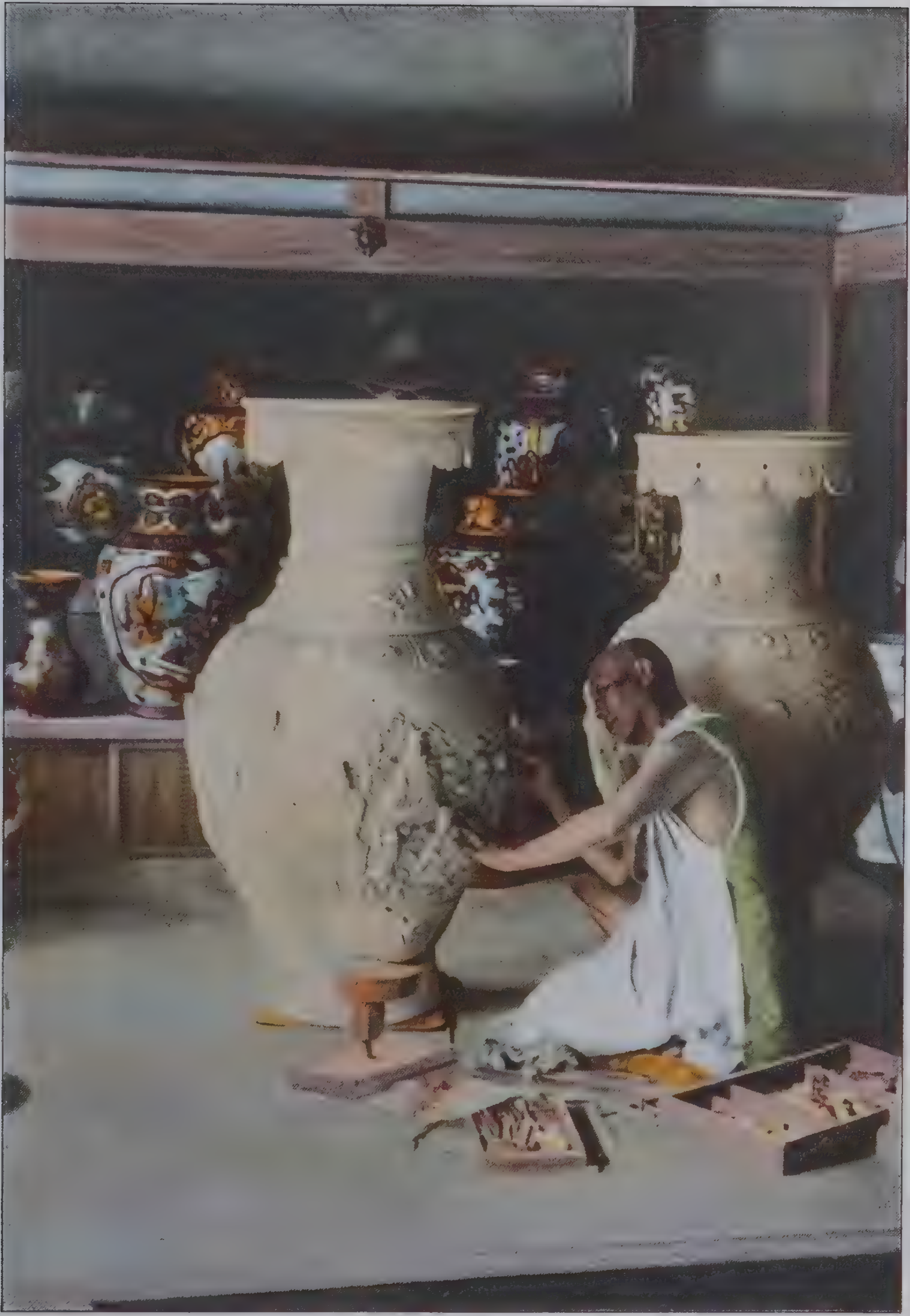
Long before an American missionary devised the jinrikisha as a vehicle for his invalid wife, the wealthy Japanese traveled in palanquins, the oldest style of carriage in Nippon. The Japanese attribute the invention of the jinrikisha, or kuruma as they call it, to an elderly paralytic gentleman who lived in Kyoto fifty years ago.



Photograph by Kiyoshi Sakamoto

A PRIEST-DOCTOR OF OLD JAPAN

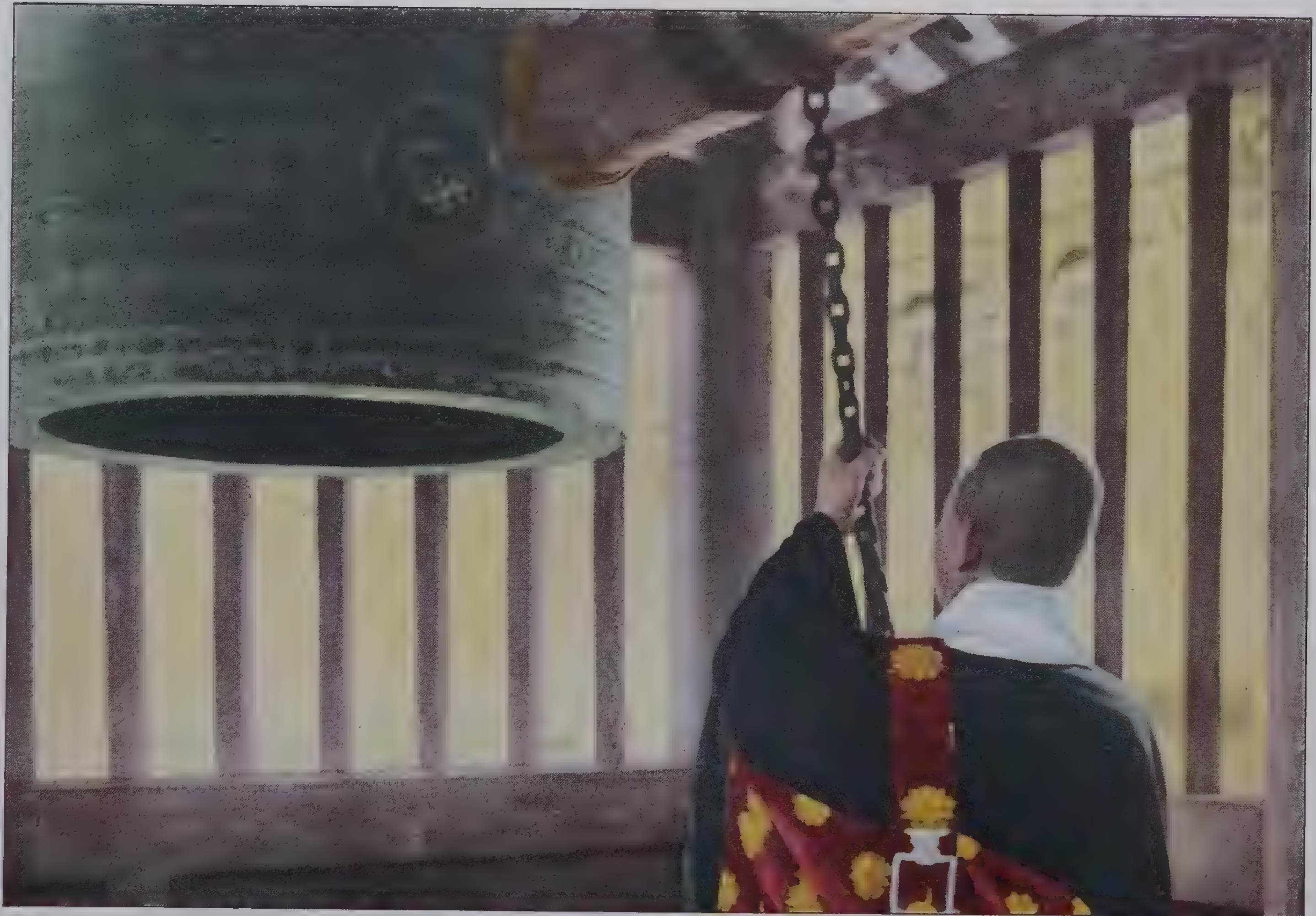
Living in isolated huts "beyond the influences of the miserable world," these religious mendicants, who are vegetarians and celibates, come to town and make their way from gate to gate, praying in sing-song fashion for gifts of money or rice in exchange for blessings for the sick.



Photograph by Enami

A CERAMICS CRAFTSMAN

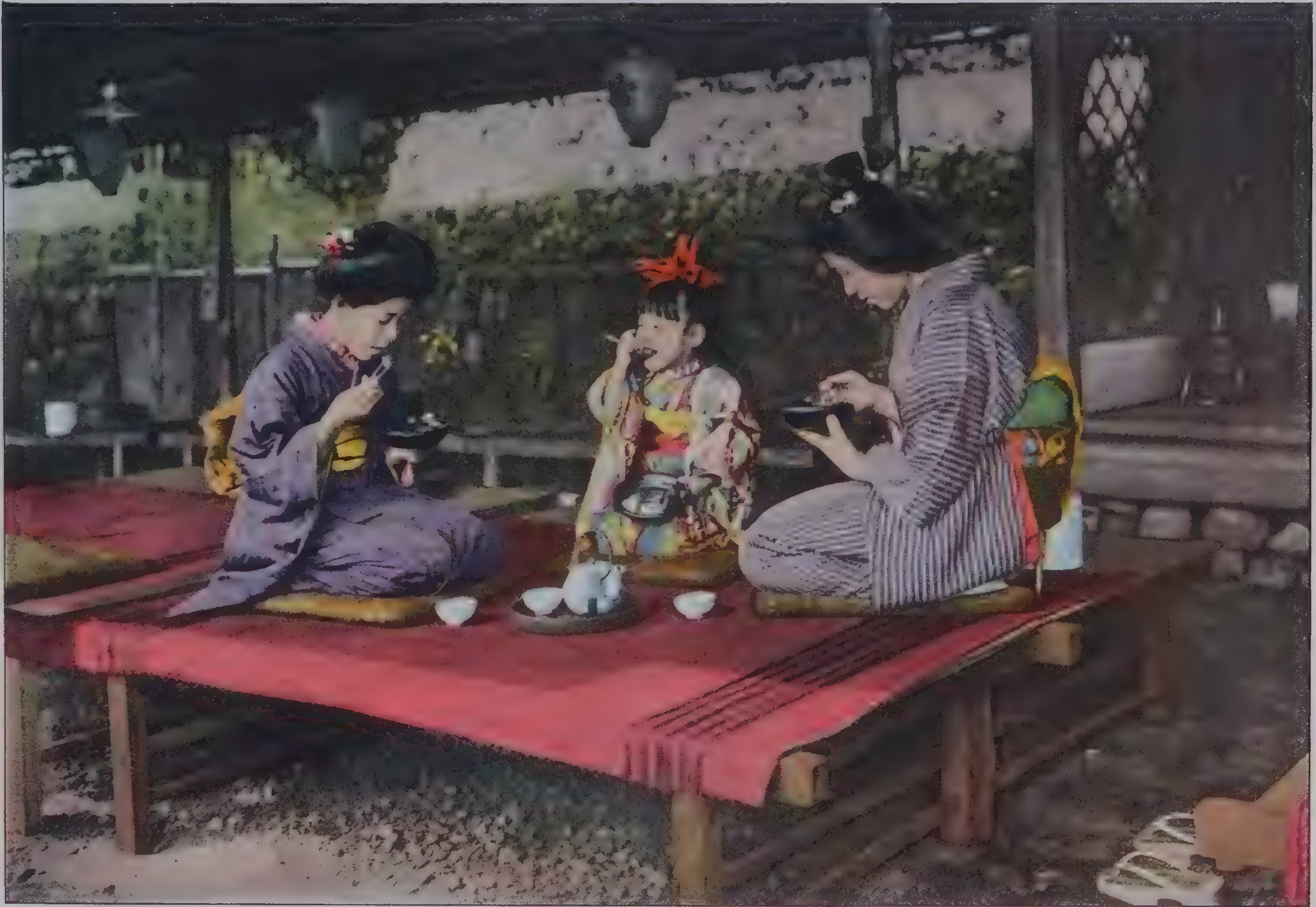
While quantity production has cheapened the quality of the output in many of Japan's famous porcelain centers, there still remain artists capable of producing the finest examples of an ancient handicraft. America is the most discriminating market for Japanese cloisonné ware.



Photograph by Kiyoshi Sakamoto

"FOR THE TEMPLE BELLS ARE CALLIN'"

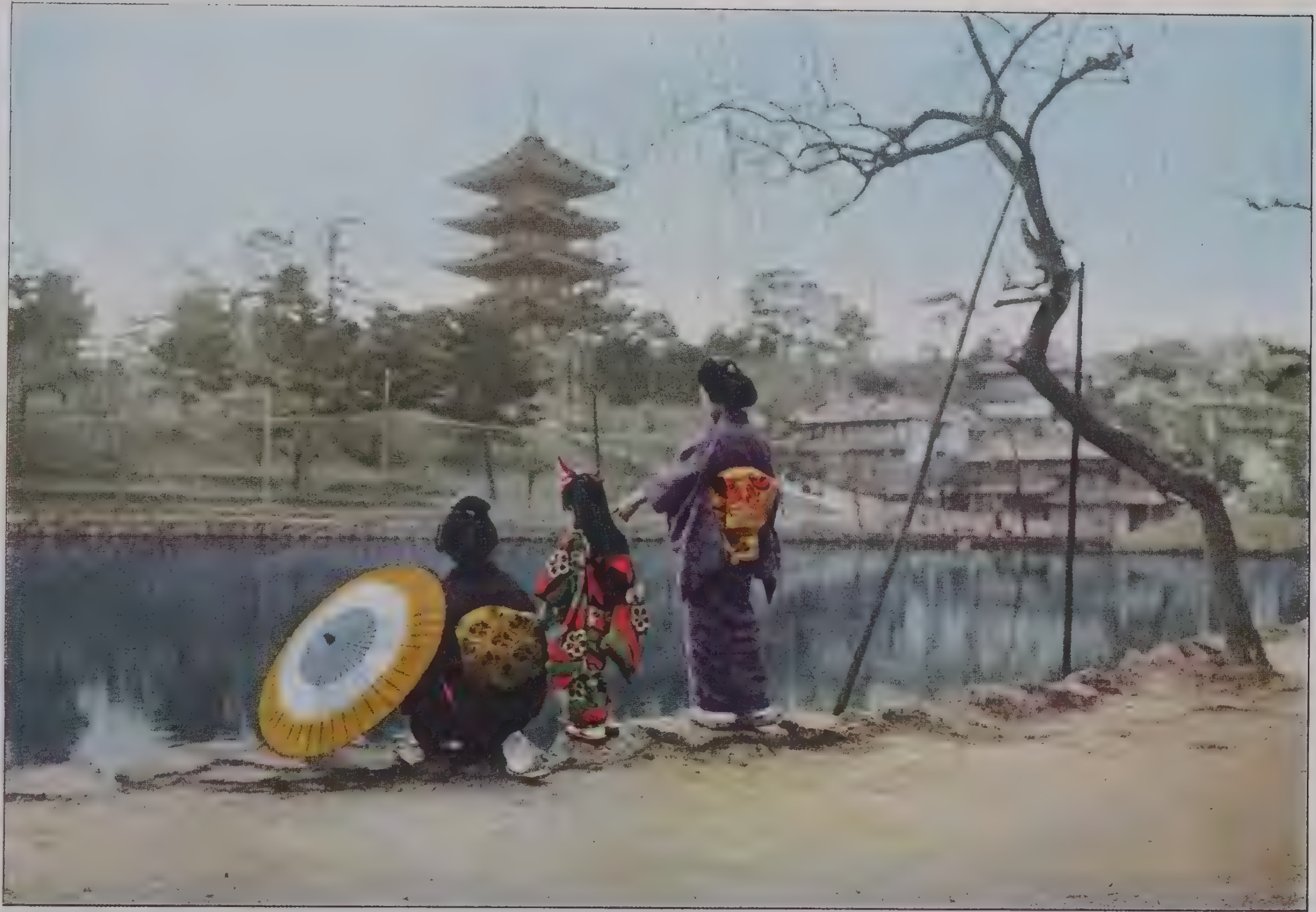
Instead of the familiar clapper or hammer of occidental bells, the Japanese employ a sound producer which resembles a battering-ram. Note the medallion cast in the bell, indicating the point at which it is supposed to be struck. The Buddhist priest is announcing the hour of service.



Photograph by Kiyoshi Sakamoto

THE HOUR FOR REFRESHMENTS

No matter where one may be at tea time in Japan, there is always a picturesque rest house near at hand. Few social ceremonies are observed with greater punctilio than the afternoon tea among the upper classes of the Island Empire.



Photograph by Kiyoshi Sakamoto

ON THE BANKS OF THE SARUSAWA-NI-IKE IN THE FAMOUS PARK OF NARA, AN ANCIENT CAPITAL OF JAPAN

This pleasure ground, known as Nara-Koen, is the largest park in Japan and is rich in classical memories. On the banks of its bijou lake, in which the carp are so plentiful that it is called "half water and half fish," is a shrine dedicated to a court lady of old who drowned herself after discovering that she no longer enjoyed the favor of her sovereign.

Of the 200 volcanoes of Japan, some fifty are more or less active. Their forms are most varied, some exhibiting a cluster of lofty, sword-like peaks or serrated ramparts converging to a common center like the spokes of a gigantic wheel.

Of the beautiful cone-shaped peaks, the unique example is, of course, the famous Fuji-san (Fuji-yama), the "Matchless Mountain." Its snow-clad form, rising in one majestic sweep from the Pacific shore to a height of 12,400 feet, is revered, admired, and loved by millions of toilers in busy cities and on wide-spread countrysides.

Its influence on the imagination is expressed in the art and the religious aspirations of the nation in every conceivable form. Its summit is sought by thousands of white-robed pilgrims every summer, who, during the two months of the climbing season, toil to the topmost of its many sacred shrines for adoration and prayer.

On one occasion I asked of the venerable leader of one of these bands of climbers the significance of the white garments. "We wear them," he said, "in token of the purity of thought and action which we desire and without which the mountain divinity will not listen to our prayers." Indeed, his reply was almost a quotation from familiar Hebrew poetry we know: "Who shall ascend into the Hill of the Lord, and who shall rise up in His Holy Place? Even he that hath clean hands and a pure heart."

JAPANESE REGARD OBJECTS OF NATURE WITH FEAR AND LOVE

It is, however, in the great Alpine ranges of central Japan that the influence of Nature upon man is most marked and most far-reaching. A day's journey from the many modernizing influences of the twentieth-century civilization of the capital constitutes a leap from the present day to a world of a thousand years ago.

Until we grasp this fact we can have only a very partial and misleading conception of the mental attitude of the majority of the Japanese people toward their physical surroundings. The reverence, admiration, and fear with which, as I have already pointed out, they regard the most striking objects of Nature are most forcefully expressed in their views regarding the great mountains.

But it is when we penetrate into the secluded fastnesses of the wild Alpine regions beyond, where scores of splendid peaks attain a height of nearly 10,000 feet or over, that the feelings inspired indicate a different mood. There fear is apt to replace love. Some personal experiences will perhaps best serve to illustrate my meaning.

WASPS AS SPIRITS OF VENGEANCE

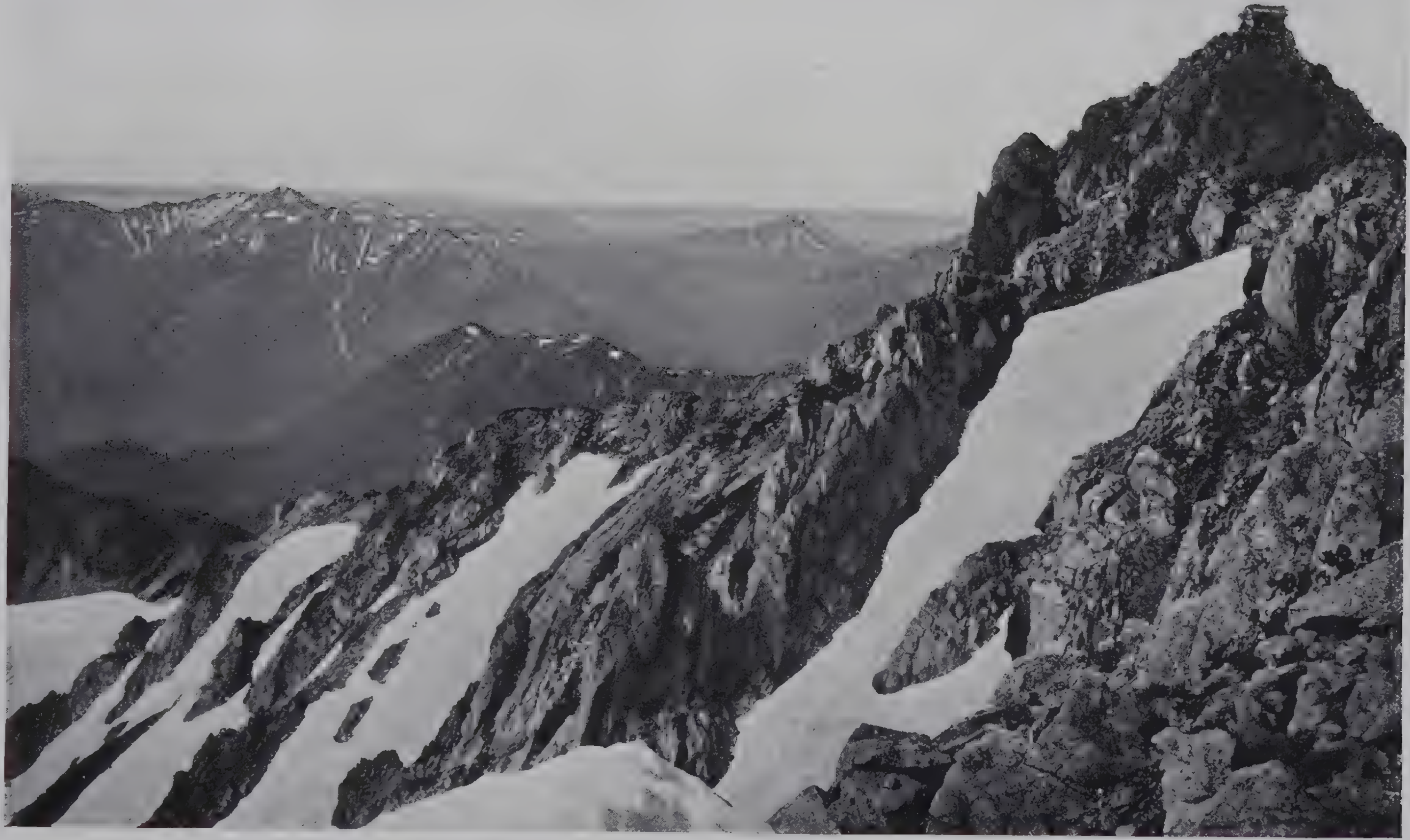
I was one day returning from the first ascent of the greatest granite peak in the northern Japanese Alps, when my hunter-guide and I were suddenly attacked and badly stung by a number of wasps on whose nest my companion, in the darkness of the forest, had unwittingly trodden.

Later on that evening, as I stood at the camp-fire, drying sodden clothes, a Japanese traveler approached with the inquiry, "Where did the wasps sting your honorable body?"

On my replying, he proceeded to squat down behind me by the camp-fire and make a series of mesmeric passes over my person. He then rose, took his stand in the doorway toward the now moonlit form of the mountain towering above, and, after clapping his hands, for a while he bowed his head in silent prayer to the Mountain God.

He then approached me with the explanation that what I had thought—and felt—to be wasps were really the embodied spirits of vengeance, sent by that divinity to punish an impious intruder who had ventured to desecrate the sacred summit with an alien hoof. He, however, possessing the power of exorcism, was able to remove the evil by its exercise.

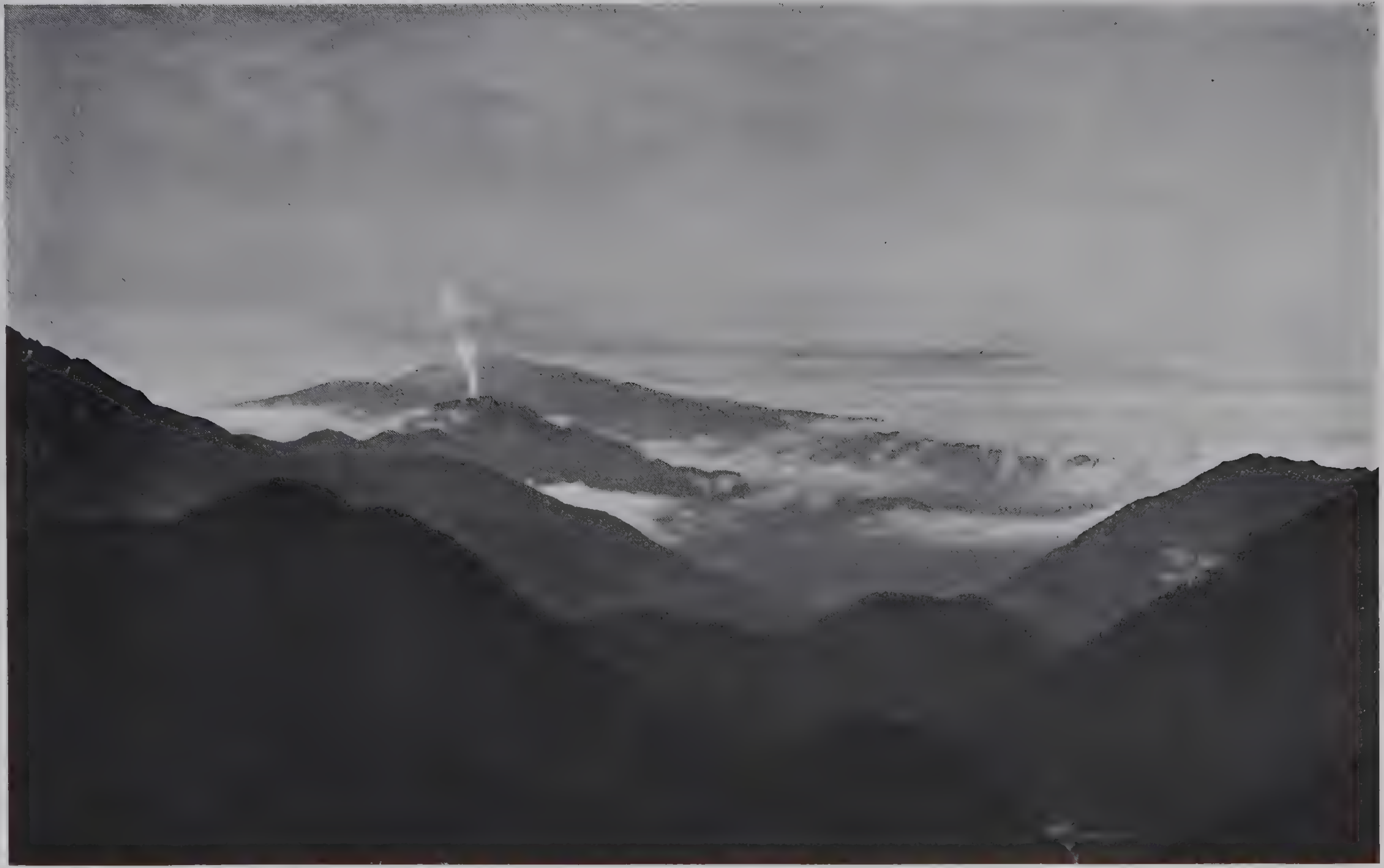
On a later occasion I was making the ascent of the pinnacle of Hō-wō-zan, another virgin peak, in the southern Japanese Alps, when my hunters stalked a fine chamois in an adjoining ravine. Meeting me later on, and carrying the carcass with them, they suddenly laid it down, scarcely lifeless, at my feet and proceeded to cut it up. The choicest portion of its interior they then respectfully offered to me to partake of, raw and



Photograph from Walter Weston

THE SUMMIT SHRINE OF TATEYAMA, IN THE NORTH JAPANESE ALPS

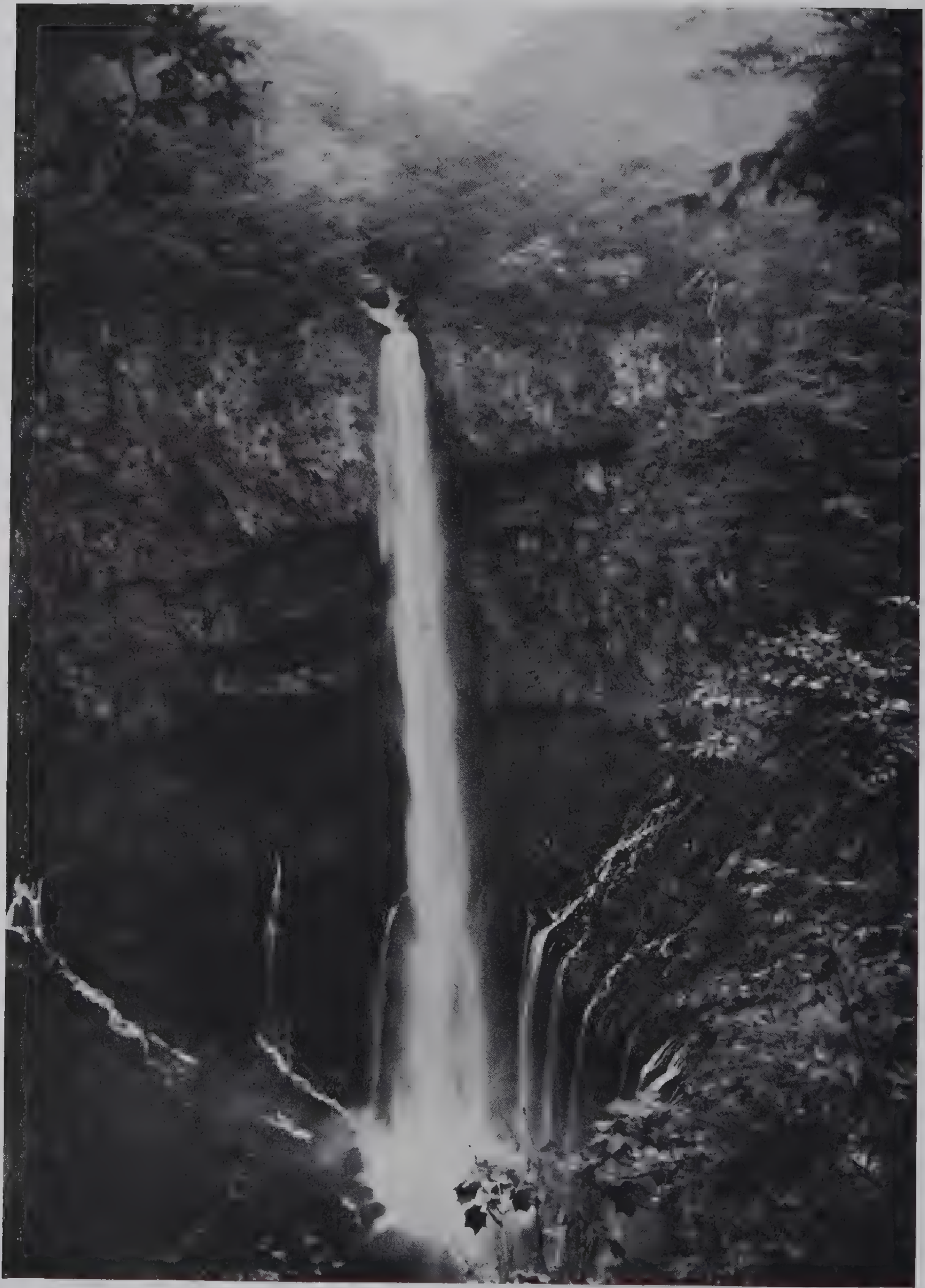
The shrine is merely a small wooden hut, but every year, from July 20 to September 10, pilgrims flock to it. Nowhere else in Japan can the traveler obtain so extensive a sweep of mountain scenery.



Photograph from Walter Weston

THE HIGHEST ACTIVE VOLCANO IN JAPAN, YAKE-DAKE

Yake-dake has a more famous twin, Asama-yama, near the summer resort of Karuizawa, with which apparently there is a subterranean connection. When one is active the other is resting for its own turn, which comes with mathematical regularity. The two active volcanoes are about fifty miles apart.



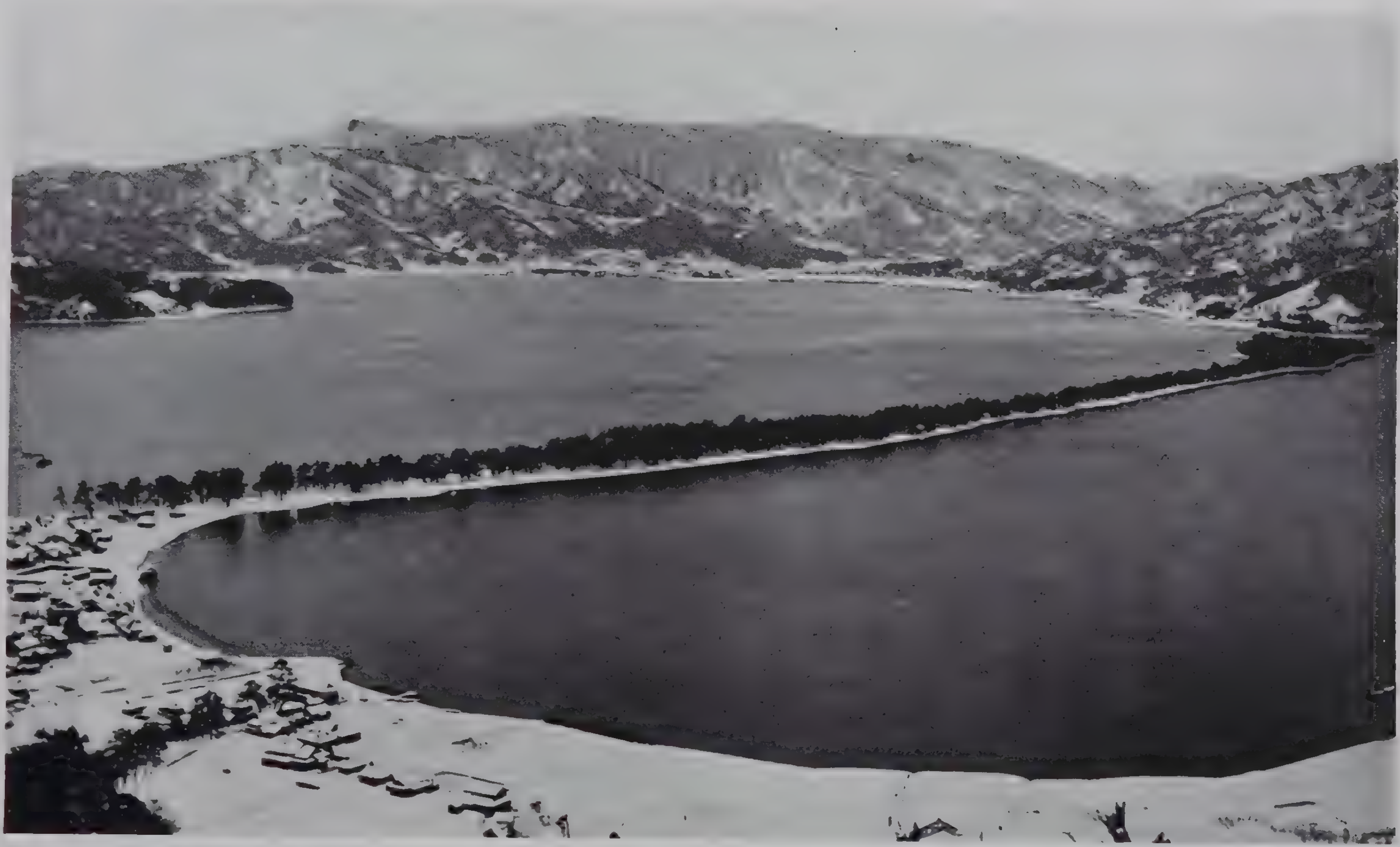
THE KEGON FALLS AT NIKKO, ONE OF THE CHIEF RELIGIOUS CENTERS OF JAPAN

The slender ribbon of water is the outlet for Lake Chuzenji, falling 350 feet into a rocky basin. Near the basin myriad minor cascades form a lovely setting.

© Kadel and Herbert

MT. FUJI AND SHIRAITO-NO-TAKI ("WHITE-STRING WATERFALLS")

"The popular description of this lovely cataract is that the two larger and the 39 smaller falls composing it are the parents and the children of a family of 41 members."



Photograph by Kiyoshi Sakamoto

AMA-NO-HASHIDATE ("HEAVEN'S BRIDGE"), ON A SNOWY MORNING, ONE OF THE "THREE FAMOUS SIGHTS" OF JAPAN

The principal feature of this superb landscape is a pine grove on a sand-bar two miles long and 200 feet wide. Ama-no-hashidate is reached by rail, 91 miles from Osaka.

smoking, with the assurance that I should thereby acquire those attributes of the chamois most desirable in a climber—nimbleness, strength, and mountaineering skill.*

They subsequently begged me, as I had been fortunate enough to make the first ascent of the mountain, to build on the summit a shrine in honor of the Mountain God, and myself to become its first guardian priest. It always appealed to me as the strangest offer of preferment and the most singular proposal for church-building that I ever received.

A frequent cause of delay or ill-success in exploring unfamiliar peaks in these regions has been the inability to obtain the help of the hunters, who alone know the best approaches. A careful inquiry usually led to the discovery either that the men were afraid to bring an alien on the sacred mountain, lest the mountain spirits should in angry retaliation destroy their crops, or that they were absent, engaged in the rite of *Amagoi,* a service of supplication in time of drought.

This service usually consisted of lighting bonfires and discharging guns to draw the attention of the god to the fire in order that he might extinguish it by sending the needed downpour of rain.

But it is on Fuji-san itself that some of the strangest of such experiences have fallen to my lot.

CLIMBING SNOW-CLAD FUJI

Many years ago, with two Cambridge friends, then visiting Japan, I climbed the sacred mountain, snow-clad in early spring. We had been warned by the village priests and policemen that the anger of the Goddess at such an untimely intrusion (for she was not "at home" to visitors except in the depth of summertime) would surely make itself felt.

As an actual fact, we had advanced only a short distance when the weather changed, a typhoon burst upon us, and we were imprisoned for three days in our bivouac half-way up the mountain. However, after the storm came sunshine and with it a successful climb, which did not bring us back to our village friends again. Their kindly solicitude, however, soon rendered us the objects of public concern, and the "foreign" newspapers forthwith honored us with the following obituary notice, translated from a well-known Japanese journal (the *Hochi Shimbun*):

"The foreigners who started to ascend Fuji with two coolies have not since been heard of. The mountain is still covered with snow, and as the summit was hidden in clouds, the visitors were urged to postpone the attempt. But these foreigners were determined to go. A few hours afterwards the storm burst, dislodging huge boulders and house roofs.

"As nothing has since been heard of them, it is feared they have succumbed to the fury of the gale. Even had they taken shelter, cold and starvation must long since have rendered them helpless. Their nationality is unknown, but we surmise that they are British, for the reason that the people of that nation like to do that which is distasteful to them and glory in their vigor!"

TENTH CENTURY MEETS TWENTIETH ON FUJI'S SUMMIT

There is one outstanding feature of this beautiful and sacred mountain that differentiates it from any other known; for there the unromantic realism and materialism of the twentieth century stretches out its hand across a thousand years and draws the tenth century to its side with all its old-world dreams and communings.

Almost at the very door of the most sacred shrine on this holy peak the post-office banner flutters in the breeze to beckon the tired but triumphant pilgrim to dispatch to the four corners of Japan the picture postcard that shall announce his successful toil.

And as at early dawn you turn from a surprised contemplation of the most up-to-date installation of modern meteorology on the crater's edge, your astonished eyes are arrested and held with reverent interest by the sight of the shivering limbs and the adoring gaze of some aged pilgrim, whose white-clothed form enshrines the flowing devotion of a primeval worship paid in all sincerity to the splendors of the "Rising Sun."

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* For an account of a similar superstition among primitive Koreans, see "Exploring Unknown Corners of the Hermit Kingdom," in THE GEOGRAPHIC for July, 1914.

MT. FUJI, IN THE RÔLE OF NARCISSUS, VIEWS ITS OWN SUBLIMITY IN THE MIRROR OF LAKE SHOJI

Fuji-san, "The Matchless Mountain," is loved by millions of toilers in busy cities and on widespread countrysides (see text, page 77).

THE NATIONAL GEOGRAPHIC SOCIETY COMPLETES ITS GIFTS OF BIG TREES

THE trustees and officers of the National Geographic Society are deeply gratified to announce to members that The Society has been continuing its effort, begun in 1916, to preserve the Big Trees of Sequoia National Park.

By a final purchase in April, 1921, of 640 acres of land in Sequoia National Park, these famous trees, oldest and most massive among all living things, the only ones of their kind in the world, have been saved; they will not be cut down and converted into lumber.

Were a monument of human erection to be destroyed, it might be replaced; but had these aborigines of American forests been felled, they would have disappeared forever. The Big Trees could no more be restored than could those other survivals of indigenous American life, the red man and the buffalo, should they become extinct.

FIRST PURCHASE MADE IN 1916

Members of the National Geographic Society will recall that, in 1916, Congress had appropriated $50,000 for the purchase of certain private holdings in Sequoia National Park, but the owners declined to sell for less than $70,000. In that emergency the National Geographic Society took the first step toward saving the Big Trees by subscribing the remaining $20,000.* Thus 667 acres were purchased. The Society's equity in them was conveyed to the government, and this tract became the property, for all time, of the American people.

In 1920, inspired by the first benefaction, three members of The Society gave The Society sums equivalent to the purchase price of $21,330, necessary to acquire three more tracts, aggregating 609 acres. Thus the original area of Sequoias saved from destruction was almost doubled.

At the request of the donors, this area was presented to the government by the National Geographic Society in June, 1920. This gift was made possible by the generosity of Stephen T. Mather, Director of National Park Service, who personally contributed $13,130; by D. E. Skinner, of Seattle, who contributed $5,000; and by Louis Titus, of Washington, D. C., who contributed $3,200.

ONE HOLDING REMAINED IN PRIVATE HANDS

There still remained one other important private holding in Sequoia National Park amounting to 640 acres. Through this tract, which is covered by a splendid stand of giant sugar-pine and fir, runs the road to Giant Forest.

To acquire this approach to the unique forest and to eliminate the last of the private holdings in this natural temple, the National Geographic Society and friends of The Society, in 1921, contributed $55,000, with which the tract was purchased. On April 20, 1921, it was formally tendered in the name of The Society, through Secretary of the Interior Albert B. Fall, to the American people.

This sum of $55,000 includes $10,000 from the tax fund of Tulare County, California, within which the Sequoia National Park is situated, a practical evidence that the people closest to the park are alive to the importance of our government owning the land.

The contributors and the amounts contributed were:

Research Fund of the National Geographic Society....................	$5,000
W. F. Chandler, Fresno, California..	6,000
George F. Eastman, Rochester, New York.............................	15,000
William Kent, Kentfield, California..	250
Stephen T. Mather, Director National Park Service.....................	14,000
Charles W. Merrill, Berkeley, California............................	250
James K. Moffitt, San Francisco.....	500
John Barton Payne, former Secretary of Interior......................	2,000
Julius Rosenwald, Chicago, Illinois...	1,000
Rudolph Spreckels, San Francisco....	1,000
Special Tax Levy of Tulare County, California.......................	10,000
	$55,000

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*See "Our Big Trees Saved," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1917.

Thus the National Geographic Society has conveyed to the United States Government a total acreage in Sequoia National Park of 1,916 acres, purchased at a total cost of $96,330.

EVERY MEMBER HAS A PART IN GIFT

It should be noted that the gifts were not solicited by The Society. The National Geographic Society asks its membership for no contributions of any sort. Its publications and its scientific and educational activities are entirely supported by their dues.

Every member of The Society may feel that he had a part in this enduring gift to his country and to posterity, for the funds appropriated directly by The Society for the purchase of the Sequoias came from the fraction of the dues of members set aside for such benefactions.

The tender was made in the name of the National Geographic Society because, as the Director of the National Park Service, Mr. Mather, put it: "It is only proper that this gift should come to the government through the National Geographic Society, in view of the keen interest which The Society has taken in the purchase of the other private holdings in this park. It was through direct gifts by your Society that we were able to save the Giant Forest, which contains the finest stand of *Sequoia Washingtoniana* in the Sierra."

SECRETARY FALL ACKNOWLEDGES GIFT

Following the presentation, Albert B. Fall, Secretary of the Interior, wrote to Gilbert Grosvenor, President of the National Geographic Society:

> DEAR MR. GROSVENOR:
>
> It was a very pleasant surprise when you called on me on April 20 and, on behalf of the National Geographic Society, presented the title deeds and other pertinent papers conveying to the United States the so-called Martin tract of 640 acres in the Sequoia National Park, recently purchased at a cost of $55,000 by your Society, through the generosity of its members, in order that this area with its fine stand of trees might be preserved for the American people.
>
> I have already personally expressed to you my sincere thanks and my acceptance of the proffered gift. Your Society on several preceding occasions has stepped in at a crucial moment and acquired several similar areas in this same park, thereby saving from extermination other wonderful trees that would otherwise have fallen under the axe.
>
> Your Society is to be highly commended on its substantial expression of a high public spirit, and on behalf of the United States I again want to express to you, and through you to the contributors, my deepest appreciation of your generous and considerate action.
>
> Respectfully,
>
> ALBERT B. FALL.
>
> Mr. Gilbert Grosvenor,
> President, National Geographic Society,
> Washington, D. C.

To mankind, throughout the ages, trees have been the most human-like, the most companionable, of all inanimate things. Aristotle thought they must have perceptions and passions. An infinitely more scientific generation still is sensible to their mystical power.

More and more will Americans visit Sequoia National Park to gaze upon the majesty of "Nature's forest masterpieces" in their last stand. National Geographic Society members may well be proud that they had a part in preserving for all time these mementoes of a past far beyond the records of written history.

INDEX FOR JANUARY-JUNE, 1921, VOLUME READY

Index for Volume XXXIX (January-June, 1921) will be mailed to members upon request.

ADVENTURES WITH A CAMERA IN MANY LANDS

By Maynard Owen Williams

Author of "Russia's Orphan Races," "The Descendants of Confucius," "Syria, the Land Link of History's Chain," and "Czechoslovakia, Key-land to Central Europe"

With Illustrations from Photographs by the Author

The author of the following article has recently returned to America after a year's tour of Europe and Asia as a staff observer for the National Geographic Magazine. *In addition to the countries of western and central Europe, Mr. Williams visited Egypt, Palestine, Ceylon, southern, central, and northern India, Baluchistan, and Burma.*

The snap-shot photograph is the magic carpet which adds a fairy-tale touch to a routine world. It satisfies man's desire to extend his horizon, to reach out into the unknown, and to identify himself a little more closely with the world of which he is a part.

Photographing the common people of foreign lands is a fascinating pastime. No fisher is forced to use more patience than the man who seeks through photography to show the folks at home how the other half of the world actually lives. No hunter can boast of so satisfactory a bag as falls to him who hunts with the clairvoyant eye of the camera. The focusing knob of a graflex is a more thrilling bit of mechanism than the trigger of a rifle.

THE PHOTOGRAPH IS A BASIS FOR FRIENDLY UNDERSTANDING

But photographing the world is not frivolous, nor is it merely good sport. If people and places are worth writing about, they are worth picturing. Such work is a step in the visualizing of our distant neighbors and the introduction of strangers to those who know no more about them than the camera tells. All the world is watching how the rest of the world lives.

It is habitual to speak of "the mask-like features of the Chinese." Unquestionably, when a Chinese wishes to conceal his emotions, the Sphinx looks vivacious in comparison, but when a casual observer insists that the people of China never smile or laugh, a few photographs reveal such an error of generalization.

The Chinese is unusually clever in disguising his feelings when he wants to disguise them; but a frank show of friendship and a readiness to smile in spite of toil, cold, or hunger are among the most prominent of Chinese characteristics (see pages 89 and 90).

When members of a family are separated, they exchange photographs. The same method is applicable to the building up of international relations. Photography, with all its faults, is a social art. It furnishes a basis for friendly understanding.

About once a year we of the Occident hear of little glass or metal bracelets, such as the girl babies of India wear, being found in the stomachs of slaughtered crocodiles. At times I wish that some one would vary the tale by making the reclaimed property a shirt-stud or a collar-button. But when the camera is called in to report on the inhumanity of distant and little-understood peoples it is quite as likely to reveal proud mothers in India as in Indianapolis.

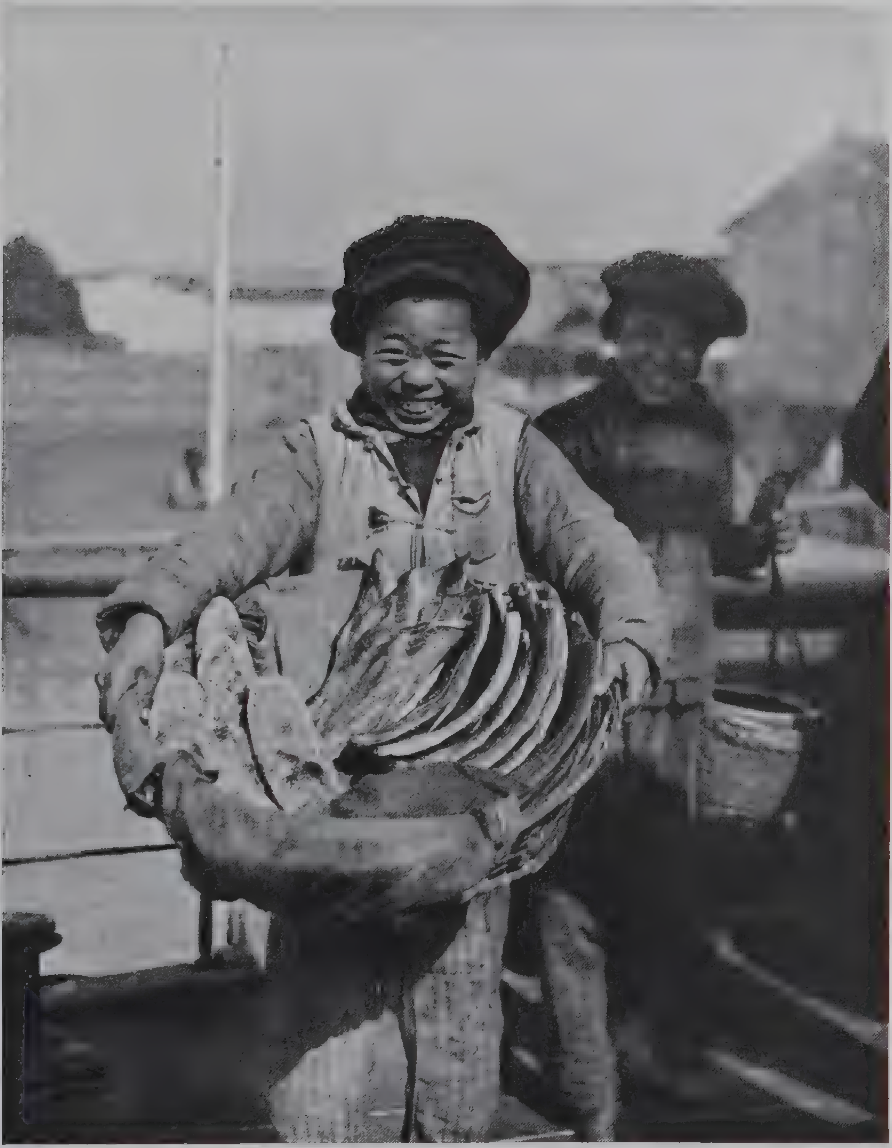
The camera enthusiast often has the same sort of an alibi as the fisherman. The ones that get away are always the best. Nor is this unnatural. Taking pictures requires concentration, and such diversion as a charming subject offers may drive all thought of formulæ from the amateur photographer's head.

A QUEEN OF THE HOLY LAND

Coming up through Palestine some years ago I was traveling with an enthusiast who had read somewhere that the

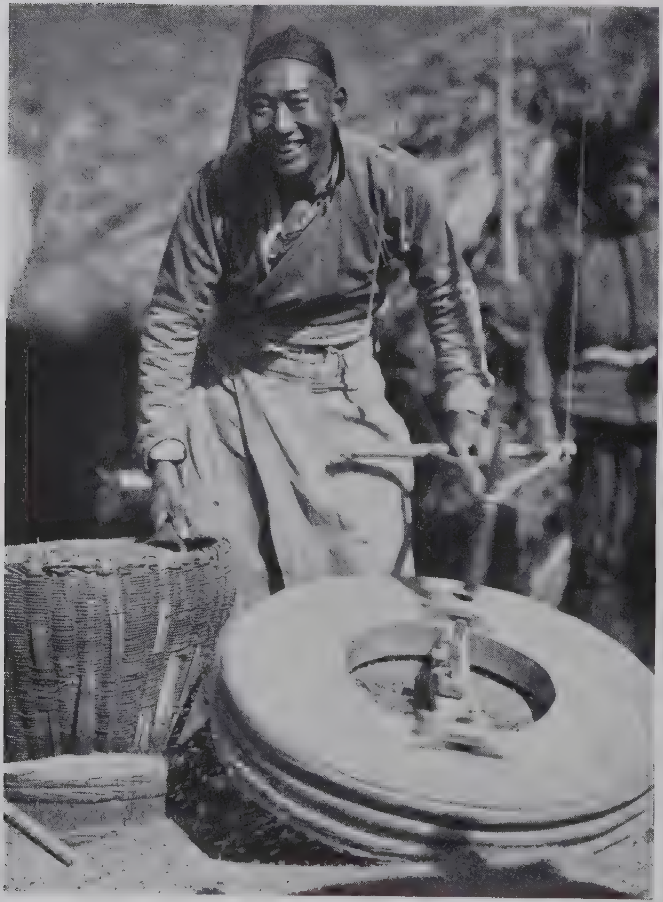
A PRIEST OF PU-TO SEES HOW IT WORKS

The lovely island of Pu-to, or Pootoo, one of the Chusan group, is one of the three most famous sites of Chinese Buddhism. Two thousand or more monks live here. At first they resented being photographed, but after looking through the camera themselves they were delighted to pose for the camera man.



"THE FACE WITH THE SMILE WINS"

A young bread-seller on a small steamer running between Ningpo and the sacred island of Pu-to (see illustration on the opposite page). "A frank show of friendship and a readiness to smile, in spite of toil, cold, or hunger, are among the most prominent of Chinese characteristics" (see page 87). Chinese bread is usually in a form which can be baked quickly and with the minimum of fuel. Poppy and sesame seeds are often used to decorate and flavor the hard loaves. Millions of Chinese do not know the taste of rice, as it grows only in well-watered tracts and the cost of transportation in a country that lacks railways makes the price of the grain prohibitive in the dry areas in the northern provinces. Poor as the Chinese are, one is seldom far from some vendor of food, whether it be bread, roast chicken or duck, or watermelon seeds, which take the place of peanuts as a Chinese luxury.



MAKING A HOLIDAY OF RICE-HULLING

The ability of the Chinese to work long hours with little food is well known, but no less remarkable is their ability to smile from morning to night, in spite of troubles which would worry less philosophical souls. Although this Chinese worker has looked up from his task to register a smile, he has not lost one revolution of his rice-huller. The lower wheel is fixed and the upper, mounted on a rude wooden axle, is turned by a raised rod. Two small ropes suspended from a joist above the wooden "millstones" help to steady the crank.

habit of carrying heavy jars of water on their heads gave to the women of the Holy Land a queenly carriage. At one of the roadside springs we halted, and after he had looked over a score or so of water-girl candidates for queenly honors, he was the most disappointed man imaginable. Then the cry of "All aboard!" rang out and the party was about to continue the ride to Samaria.

Around a curve of the road there glided a young woman who fitted perfectly the mental picture of my friend. Her raven hair was neatly parted on as fair a forehead as ever carried jet black brows above soft brown eyes. Her oval face was satiny olive, with a flush of red in the cheeks; her teeth were pearls; her nose was finely molded; but the memorable feature was that she really had the form and carriage of an uncrowned queen.

My companion made a grab for his camera, commandeered my slight knowledge of Arabic, and started off in the direction of his vision in a way that would have frightened a less capable woman. She consented to let us snap our cameras at her, and we dashed back to the carriage. A mile farther on, my friend gave a cry of chagrin. He had forgotten to withdraw the dark slide from his camera. I had not shared his enthusiasm to such a disastrous extent, with the result that a picture of our fair model appeared in THE GEOGRAPHIC several months ago.

One of the vexing problems for the photographer is the matter of tips ("backsheesh"). My own rule is never to offer or give tips to those who let me take their photographs unless they are professional beggars, hardened in their vice. The tourist centers of the world have been spoiled by those who have distributed extravagant largesse in return for photographic rights. One can be given privileges that he cannot buy.

A RELIGIOUS NOVICE IN A FRIENDLY MOOD

Under the shade of a tree in the Rawalpindi bazaar, this young Hindu neophyte turned from the silent contemplation of his naked leader, smeared with ashes, to smile into the camera (see p. 97).

You can't ride a high horse or a motor car and get familiar close-ups of common folks. The people of the East are suspicious of those camera hunters who stalk their game from the cushions of an automobile.

CAMERA HUNTING IN BALUCHISTAN

From Quetta to Sibi, in Baluchistan, I rode on the cowcatcher of a locomotive over one of the weirdest scenic routes in the world. A luxurious seat, upholstered in leather, had been placed on the front of the engine for my use, and the station masters whom I encountered were not sure but what I owned the line.

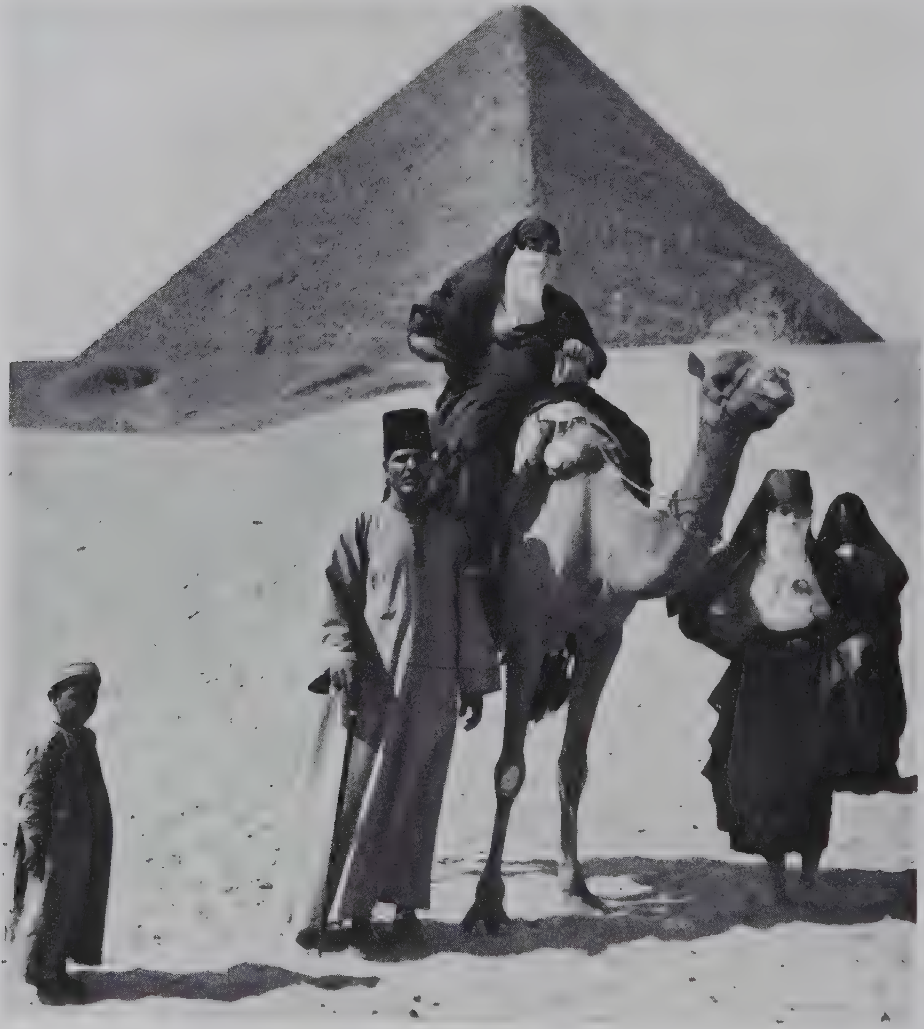
At one station I noticed a charming little girl, wearing a lemon-colored scarf with that grace which western women seldom attain, because their drapery is arranged by their dressmakers and not by themselves. But that lovely Hindu child up there in the bleak regions of Baluchistan was afraid of the black box and its Polyphemus eye.

The station master knew that if I had a private lounge attached to the engine I must be a Lieutenant-Governor or a General at least, and he feared that if his daughter balked he might be subjected to censure. He explained and pleaded, but in vain. He even dragged her toward the camera.

BUYING A SMILE WITH A TIN BOX

Now, the first rule of the photographer should be the Golden Rule; and, in any case, I had no desire to picture that lovely child in tears. I gave her the tin container from which a reel of film had been taken. She smiled. I gave her some of the chocolate almonds which constituted my lunch. Again she smiled her thanks. She had no dislike for me personally, but she would not let me point the camera at her, for she feared that it might be loaded, even if I didn't know it.

Then I let her look in at the top and showed her the locomotive and the barren hills and the long-haired Baluchis, with their spinster curls, and the smiling face of her father. If she had been a movie queen, drawing $100 a smile and $1,000 a tear, she could not have been more



VEILED WOMEN MODELS IN A WORLD-FAMOUS STUDIO

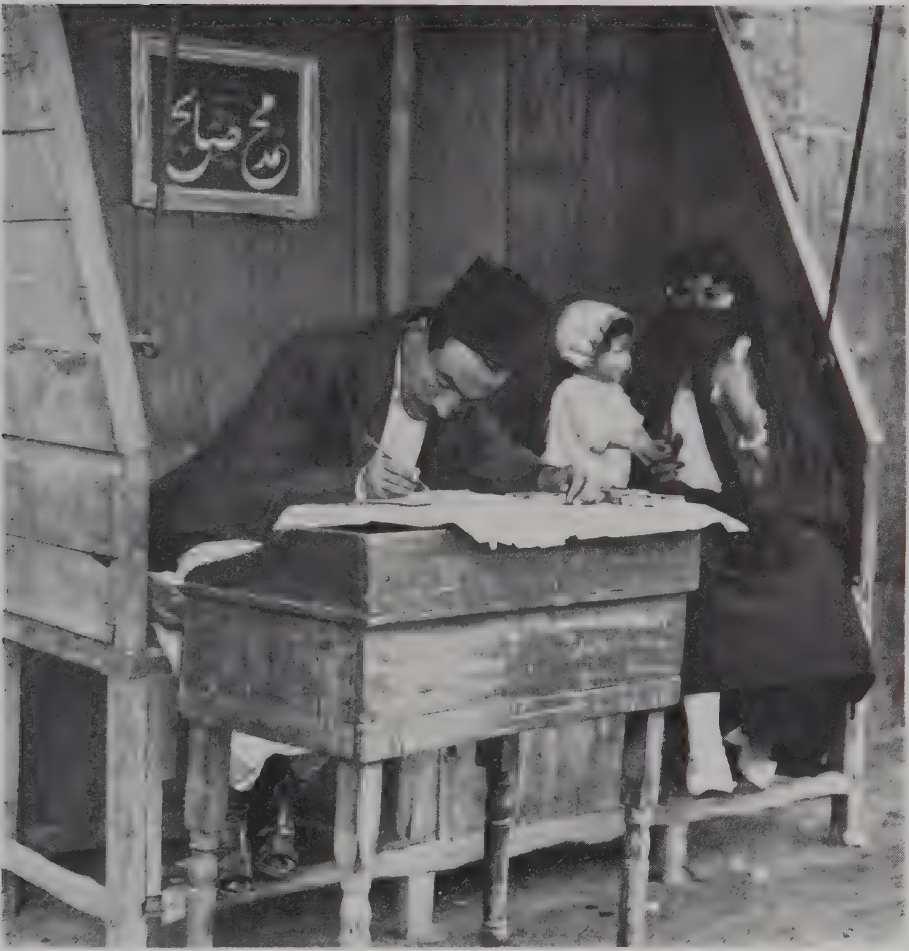
It is "the thing" for foreign visitors to have their portraits taken beside the Sphinx; but few are the veiled women who have consented to being photographed there. Women are, however, becoming more independent, even in the morning lands of history (see text, page 101).

magnanimous in letting me photograph her after that.

"I PRESS THE BUTTON; YOU DO THE REST"

Time and again I have had to show illiterate people what the mysterious black box really is. One man with whom I traveled suggested that the unwashed people who formed in line to look through my graflex would probably breathe a million different kinds of disease germs into the hood of the machine, and he pictured the possibility of my contracting pink eye, diphtheria, and other dread diseases as the result of my experiment.

But one can't get friendship without giving it, and a portrait is not a mechanical thing, but a collaboration between subject and photographer. "I press the button, but you do the rest" is one of the slogans to be kept in mind when taking



A SCRIBE OF CAIRO COMPILING THE DAY'S GOSSIP

Humbly housed in a tiny stall, which looks like the deserted home of an upright piano, the Egyptian letter-writer plies his trade. Not only all the intrigues of the mystic East are poured into his ear and flow from his fingers, but he conducts such normal business as that of which any grammar-school child would be capable.

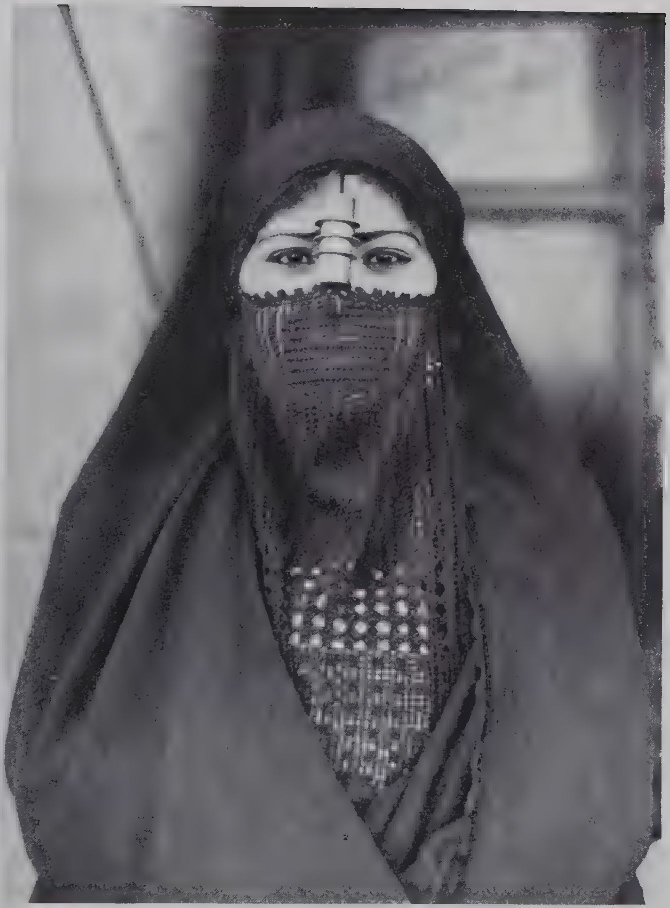
pictures of Asiatic peoples, upon whose good will the recorder of pictorial geography must rely.

It is this coöperation with those common folks who cannot speak his language which robs many a photographer's day of loneliness and makes the picturing of foreign peoples a delight such as the lion-hunter never knows. I have never seen a smile on the face of the tiger which has fallen before the rifle of a sportsman, but I have captured many a very friendly smile with my camera.

These smiles of brotherhood flashed half way around the world are the symbols of mutual confidence and understanding.

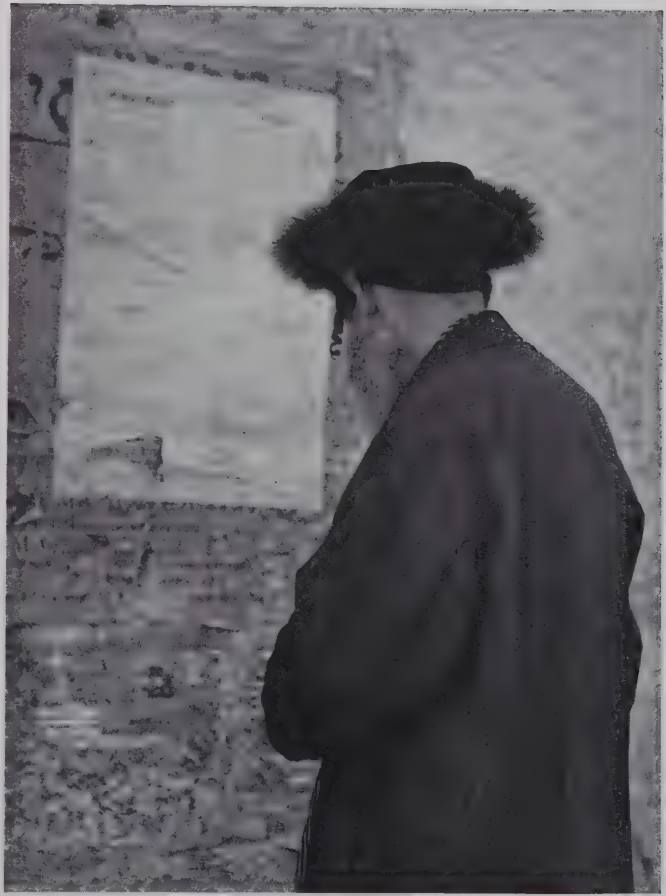
IN THE RAWALPINDI BAZAAR

The Rawalpindi bazaar, by all the conventions of guide-book emphasis, is a place of no importance at all. In the midst of the busy street, a crude rolling-mill turned by hand transformed sugar-cane from ambrosia to nectar. Sitting on a pile of a thousand suits of cast-off



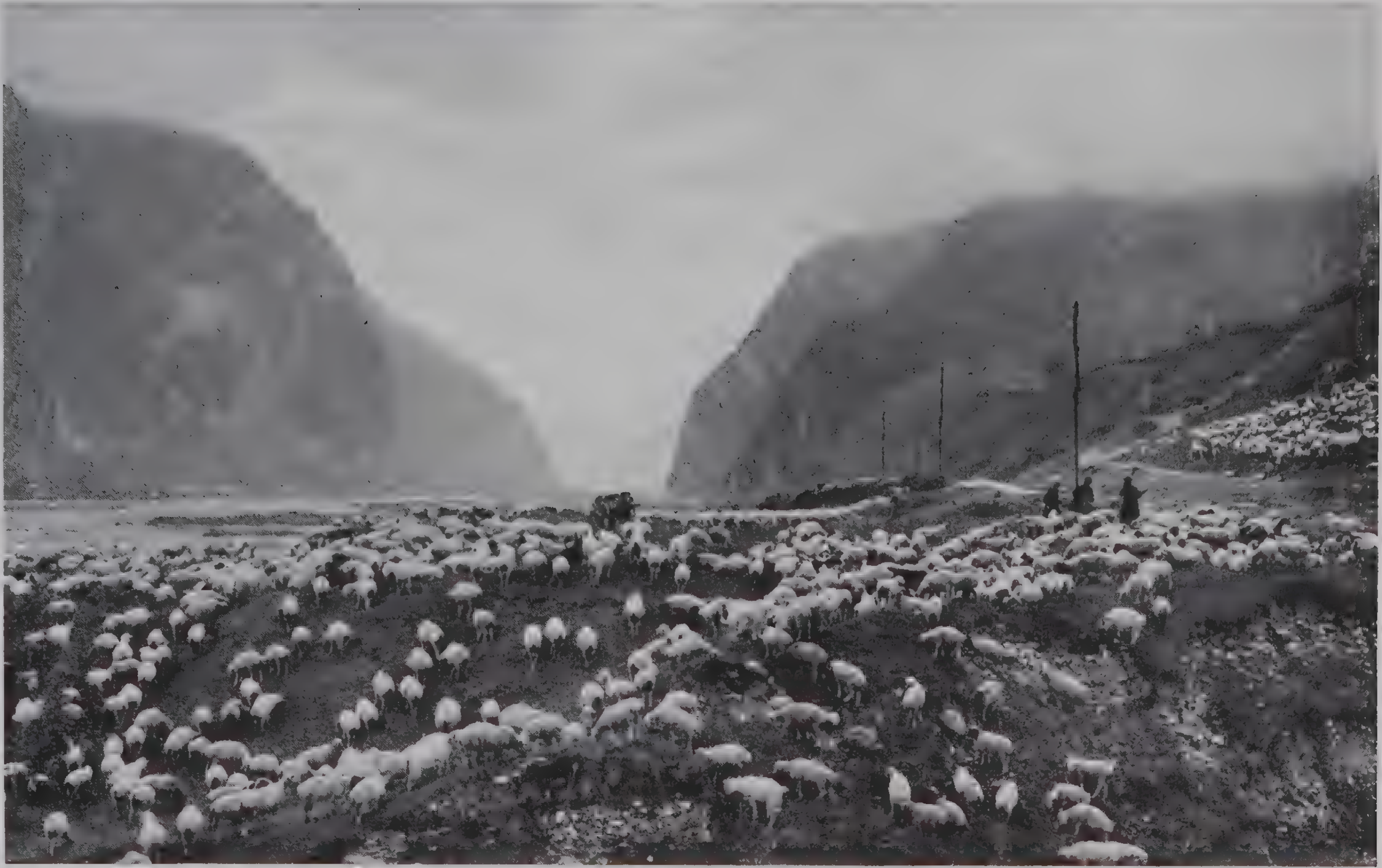
A MOSLEM WOMAN OF CAIRO WEARING THE BLACK BURKO, OR VEIL

In spite of radical changes following the war, many of the respectable women of Egypt still cling to the veil. The white gauze veil usually worn by Turkish women is often seen, but the heavy black veil and the ringed golden spool worn between the eyes are still preferred by most Egyptian women.



READING A PROCLAMATION UNDER THE NEW RÉGIME IN JERUSALEM

Dressed in long gaberdines and wearing plush caps edged with shiny fur, the Jewish population of Jerusalem can now read proclamations in their native tongue, send telegrams on blanks printed in Hebrew, and read Hebrew newspapers only recently born.



THE GATE TO ASIA ALONG A HISTORIC ROAD

Through this gorge in the Caucasus Mountain the Terek River has marked the route for countless hordes who have passed these portals on their way to or from Asia. The large flocks which go high up the mountain slopes in summer are here seen in October, making their way to the rich plains of the North Caucasus.

PRACTICING CONCENTRATION WITH THE AID OF MIRROR AND TWEEZERS

The capacity of the Indian for deep concentration has long been recognized. But a mirror and a pair of tweezers can sometimes lead to greater concentration than is usually given to the fourth dimension or the Einstein theory. In Rawalpindi, as in America, the barber is the beauty expert for masculine faces, but there are some things so important that a man prefers to do them himself. So engrossed was this individual in his toilet that he never saw the photographer.

army clothing, the city Solomon Levi figured up his losses on the last sale. Fruit venders had their luscious stock displayed in golden pyramids or ruddy cones touched here and there with bits of tinfoil light. Cattle strolled about at will, and, sitting beside the dusty road, a solemn personage gave such close attention to his chin that he neither saw my camera nor heard it click.

Under a tree whose dense shade lay like a tangible thing in the thoroughfare, two holy men sat beside a smokeless fire which cast a sheen on their naked chests, although beyond the boundary of their leafy shade the sunlight was intense. Around them sat several novices, bright-eyed lads who had not yet attained that air of detachment which characterized their leaders.

One of the novices had an enormous shock of hair, which looked like a gro-

A CORNER OF THE SMOKING-ROOM OF A MEN'S CLUB AT HAIFA

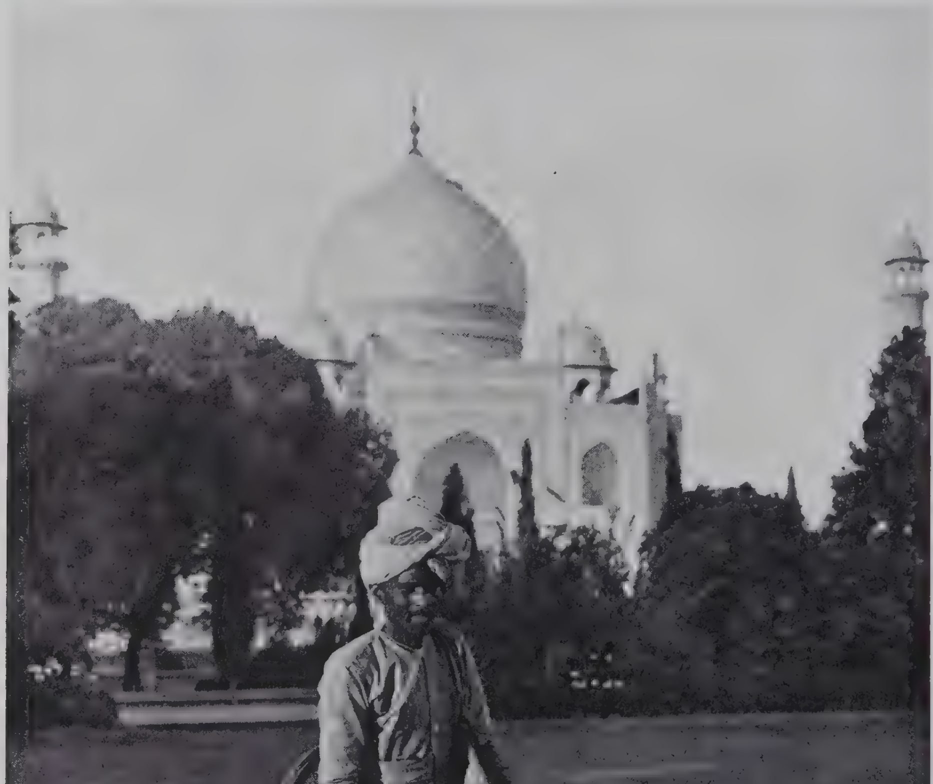
When and if Haifa becomes the main port of Palestine, more modern accommodations may be furnished the visitors in bright head-shawls who visit the port at the foot of Mount Carmel; but no modern improvements can better the Levantine open-air cafés, where thick Turkish coffee and snaky-tubed *nargilehs*, mixed with a liberal supply of gossip, serve to pass many a pleasant hour.

tesque wig. His face was most expressive. As his eyes and teeth flashed out from the dense shadow, the gamut of passions was reflected on his features.

Here was a boy whose life no one of us could understand, across whose features human emotions played with vivid force. As he smiled over his bare brown shoulder, I snapped the camera. Then he turned back to the contemplation of the smokeless fire and the naked religious leader to whom he had attached himself. I returned to the table d'hôte dinner at the English hotel. But for a moment we had smiled into each other's eyes and for a moment we had understood.

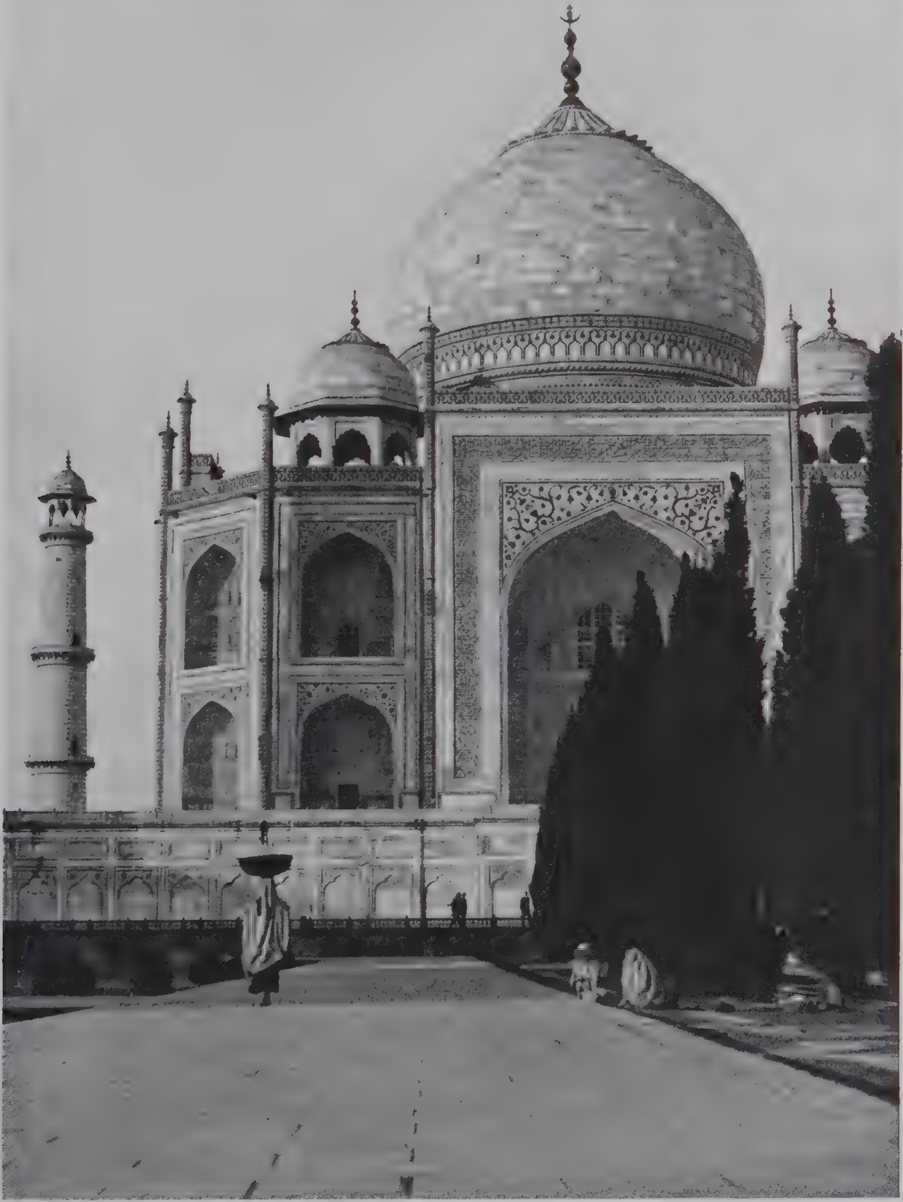
GETTING PICTURES OF MOSLEM WOMEN IN EGYPT

It is harder to get a man to pose for a photograph than it is to get a woman's picture. On the other hand, one can take a man's picture without asking permission and run little risk of causing trouble,



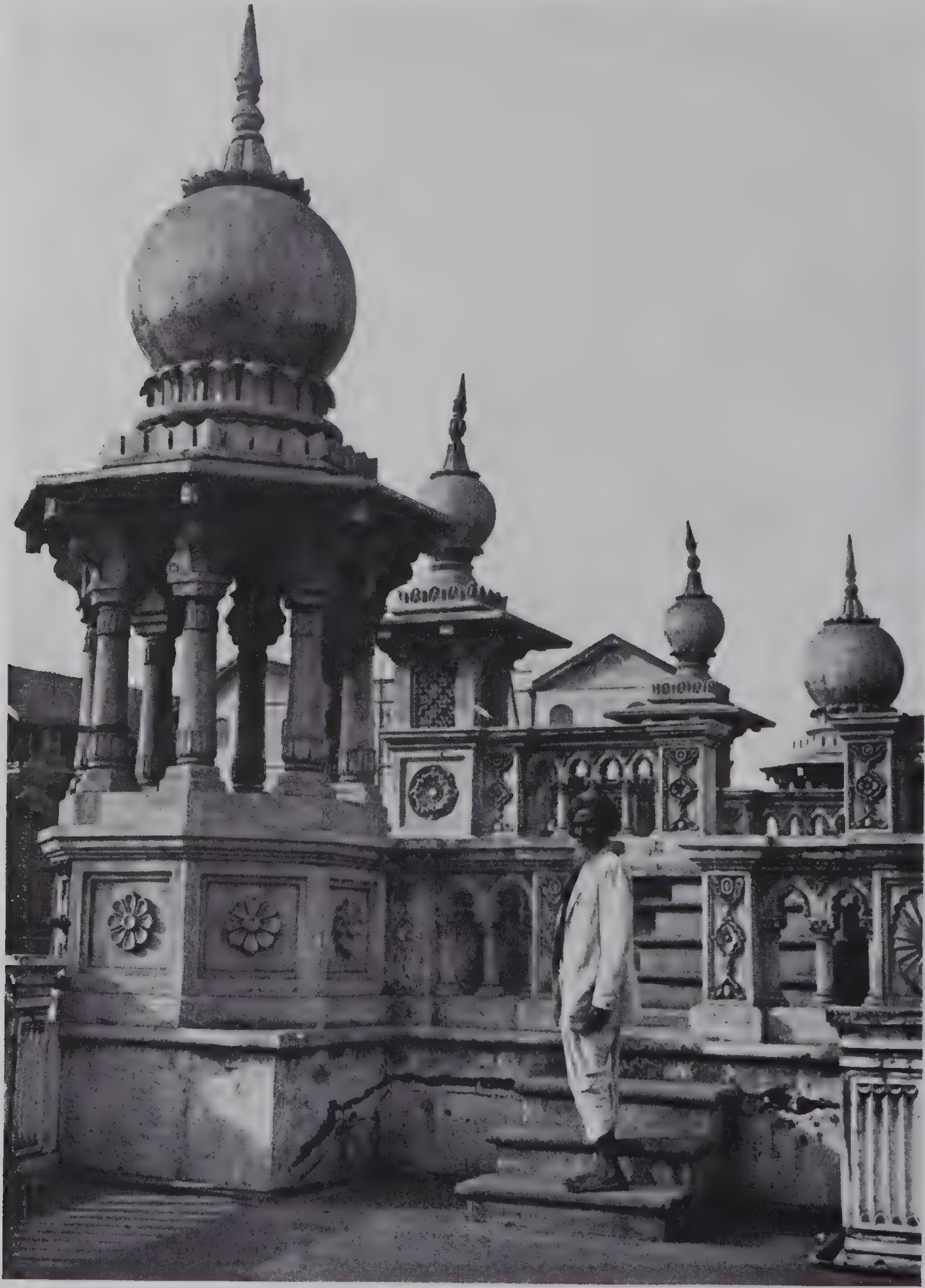
KEEPING GREEN THE SETTING OF "THE CROWN LADY'S TOMB"

The beauty of the Taj Mahal is unchanging, but the emerald setting is continually being renewed. Trees become so large that they shut off a view of the gem of all buildings and have to be removed. The "dream in marble" also gains much of its charm from the opalescent tints which touch the murky waters of the Jumna at sunset time.



A HUMBLE SERVANT AT THE TAJ

Not every visitor to Asia's loveliest building realizes how much of its beauty depends upon the perfect care taken of the gardens, which form a splendid setting for the mausoleum in which Shah Jahan and his beloved Mumtaz i Mahal lie buried. The monument is the more remarkable in that it stands in a land where polygamy is common and where women do the most menial labor.



SCULPTURAL DETAILS OF A BOMBAY MOSQUE

With tungsten filament lights in the mihrab, or prayer niche, with electric fans plentifully supplied, with clean matting on the floor and a clock to prevent religious fervor from wearing out patience, this Bombay mosque is well equipped to make a strong bid for favor.

TWO YOUNG BOMBATHERS ON THE BEACH

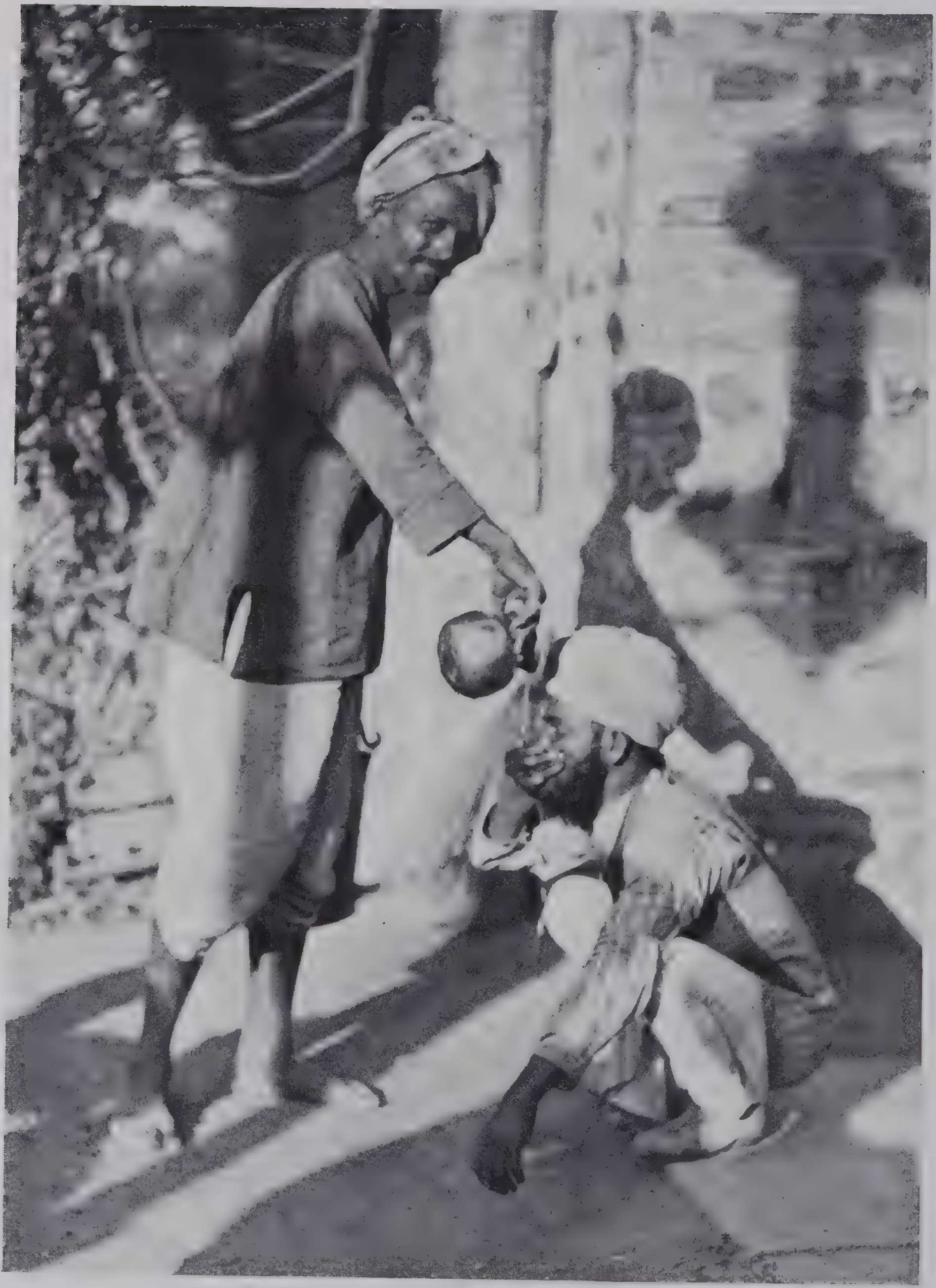
Between the Fort and Malabar Hill, at Bombay, there is a long line of beach which is very popular with the natives. There are no bath-houses, but each bather brings an extra costume. One serves as a screen behind which the dressing or undressing is carried on. The wet garments, after the bath, are dropped to the sand within the protecting circle of the clean garments, which are then donned, and a few sweeps of the wet sari against the hot air serve to dry it thoroughly.

while it is dangerous to take pictures of some of the women of *harem* or *purdah,* whether they are veiled or not.

In Cairo a Moslem woman with most hypnotic eyes was dictating a letter to a professional letter-writer. She sat perfectly still and looked straight into the camera when I asked her in sign language if I might take her picture. Obviously she was a person to whom I could not offer money, but I thought that such a woman would like to have a copy of the picture sent to her. The letter-writer, it developed, spoke English, and I was so grateful to this fair Egyptian for this unusual opportunity that I asked him to tell her that if she would give her address I would send her a print.

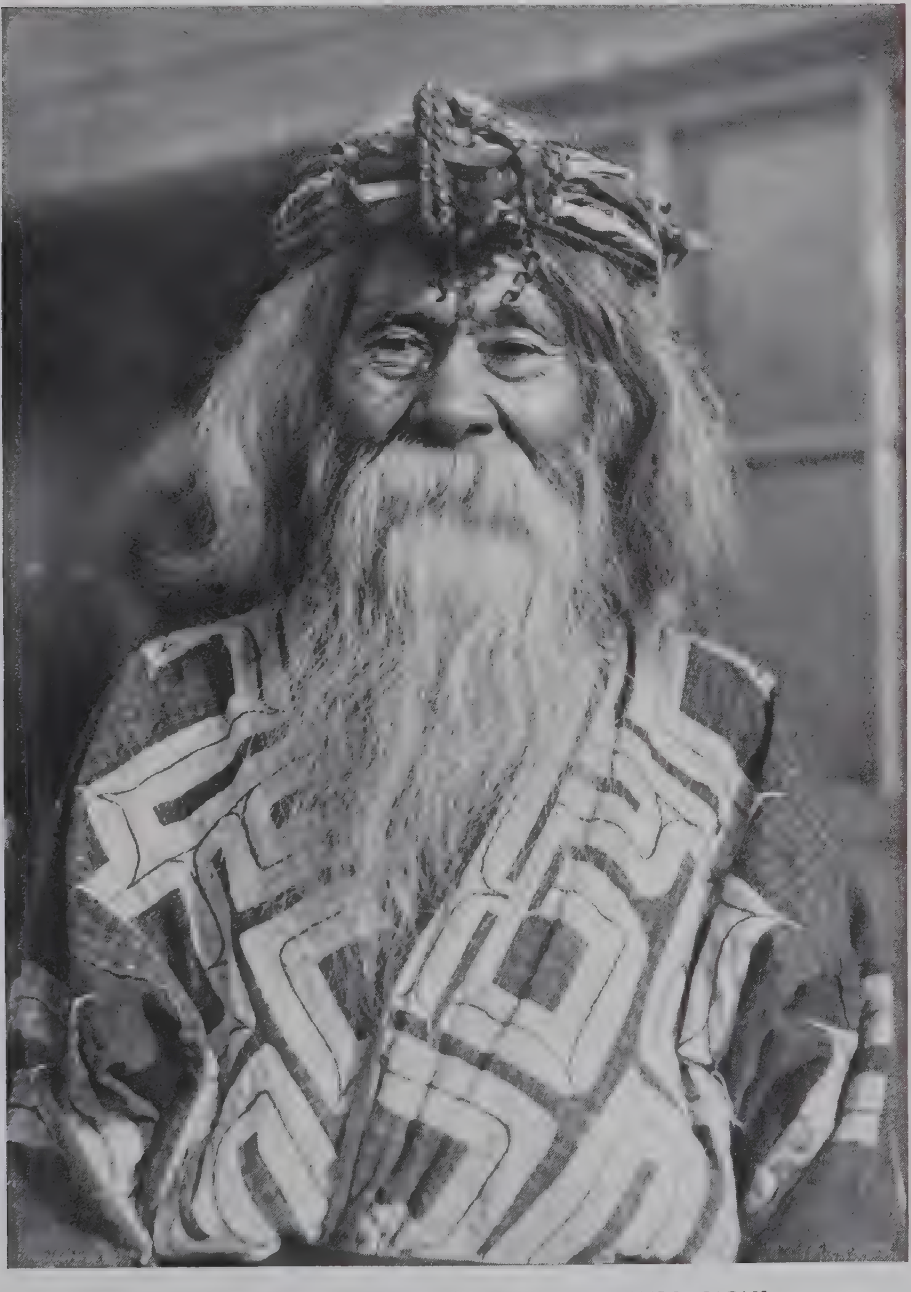
"If her husband know she let you take picture, he beat her," replied the scribe after a hurried consultation.

But out at the Pyramids two women



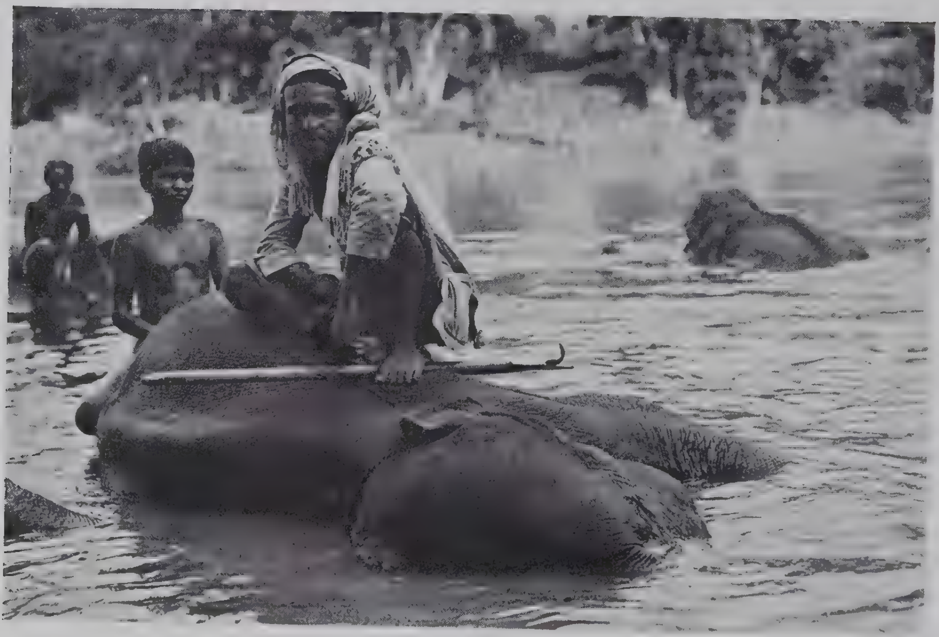
AN ORIENTAL SANITARY DRINKING FOUNTAIN

Eastern lands have their advantages, and among antagonistic races and faiths there are ways of living without offense. Syria has its nozzled jug from which one may drink without touching his lips to the vessel, and here in Udaipur, India, a Brahmin is giving water to a Mohammedan without danger of contamination by either, unless the Brahmin's thumb overreaches the brim of the brass bowl.



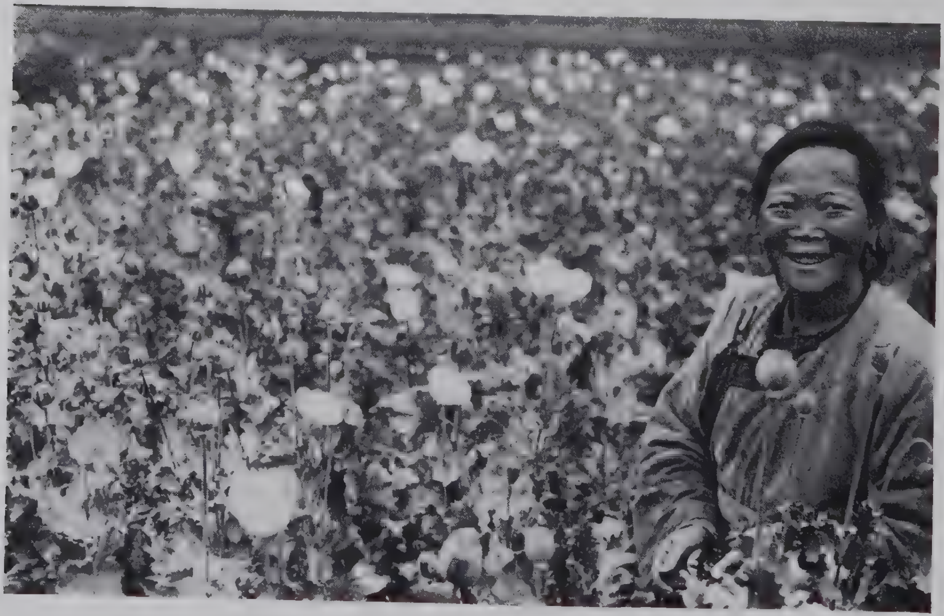
AN AINU SAINT NICHOLAS OF SHIRAOI, HOKKAIDO, JAPAN

The tanbark headdress which this Ainu chieftain wears is a prouder crown than many that are still worn in other parts of the world. Bear hunting furnishes the inspiration for many an Ainu tale, and, when the clans gather, a bear dance, in which grave men and ugly women with moustaches tattooed on their lips join, is always the head-line act.



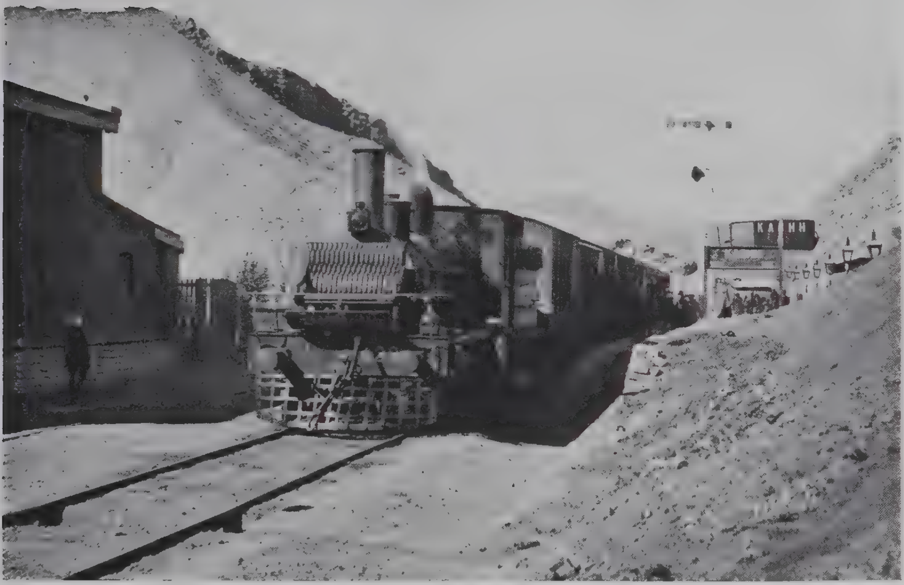
ELEPHANTS ARE STRONG ADVOCATES OF SHORT HOURS

In Ceylon the beasts of labor are worked only during the morning. By noon they are lying in the water of some palm-fringed stream, having their hides softened with plenty of water and coconut husks, briskly applied. Pachyderms do not have tender skins, but care has to be taken to see that they don't crack.



AN OPIUM POPPY FIELD IN FUKIEN PROVINCE

In the spring of 1919, when this picture was taken, the Chinese burned millions of dollars' worth of foreign opium in specially built furnaces at Shanghai; but the Chinese war lords of North and South induced the peasants in the region occupied by their mercenary armies to plant opium poppy in order to afford quick revenue.



AN OBSERVATION SEAT ON A TRAIN IN BRITISH BALUCHISTAN

One of the weirdest scenic routes in the world lies between Sibi and Quetta. A more direct though steeper route has largely superseded the Harnai loop, but the traveler is well repaid for abandoning the express and taking the trip through the barren hillocks which characterize this part of the world. With the thermometer at 25 degrees, this observation seat affords all the fresh air and wide prospect that any passenger could ask for, but it is only placed on the engine by special order of the railway officials (see text, page 91).

gladly let me take their pictures, both veiled and unveiled, and although neither would tell me where I could send her a picture direct, I did send photographs to the husband of one, while the other had her picture sent to her through her camel-driver!

AN ENCOUNTER ON THE BATHING BEACH AT DELHI

At Delhi there is a long sand-bar beside the River Jumna, where thousands of men and women bathe in the murky water. Here and there are small shelters in which the high-caste women change their *saris*, but the whole riverside is one vast open-air dressing-room, without a trace of immodesty on the part of any one. Food-sellers and hawkers of toys and notions dot the sands and the whole scene is a blaze of color and movement.

A six-foot foreigner wearing a glaring white sun helmet and carrying a camera has about as much chance of hiding in such a crowd as the man who sneezes while the tenor is climbing to his prize note, but I took several photographs of the crowd without any one showing hostility.

Then there came up a man who, by wearing a spotless turban, a well-pressed Prince Albert, and trousers rolled up to his bare knees, and carrying neat button shoes and ungartered socks in his hand, formed a fit subject for a photograph himself. Strangely enough, it did not occur to me or to him that he would do as a model for an art study.

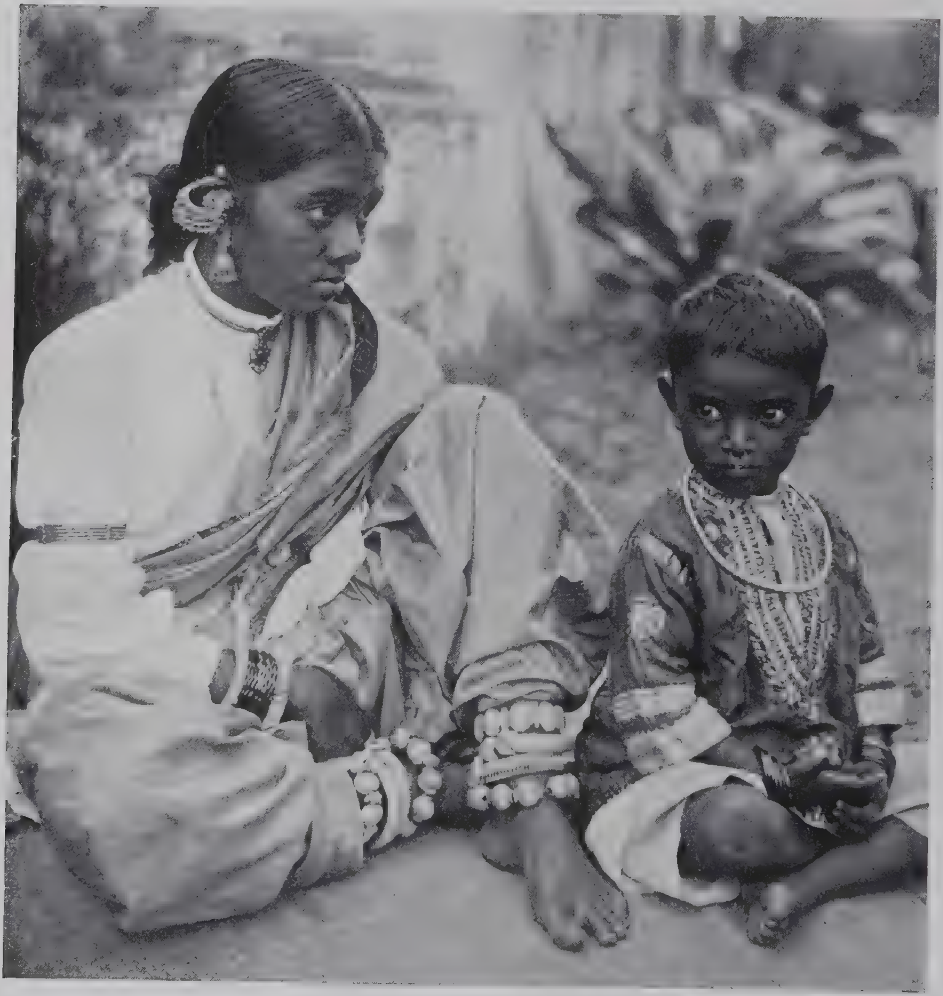
He told me that I really ought not to be taking pictures of the people. "Especially the women," he said.

"Why not?" I asked, just as though I was accustomed to seeing the outside world changed into a boudoir.

"All these women are in *purdah*. No man must look upon them," was his startling reply.

"How do you know there are any women here, then?" I asked.

At that moment a dusky queen passed



A HIGH-CASTE MOHAMMEDAN WOMAN OF ONGOLE, INDIA

Although Mohammedans keep their wives in close seclusion, the husband of this Moslem lady was so grateful to a Christian medical missionary for saving the life of his boy that he allowed a friend of the doctor to take her photograph dressed in her best silks and jewelry. The banks of India are wrists, ears, and ankles.

us, just as she had emerged from the water, with her gaily colored *sari* plastered to the lower portion of her body and with her well-built figure doing graceful imitations of a quickened Venus.

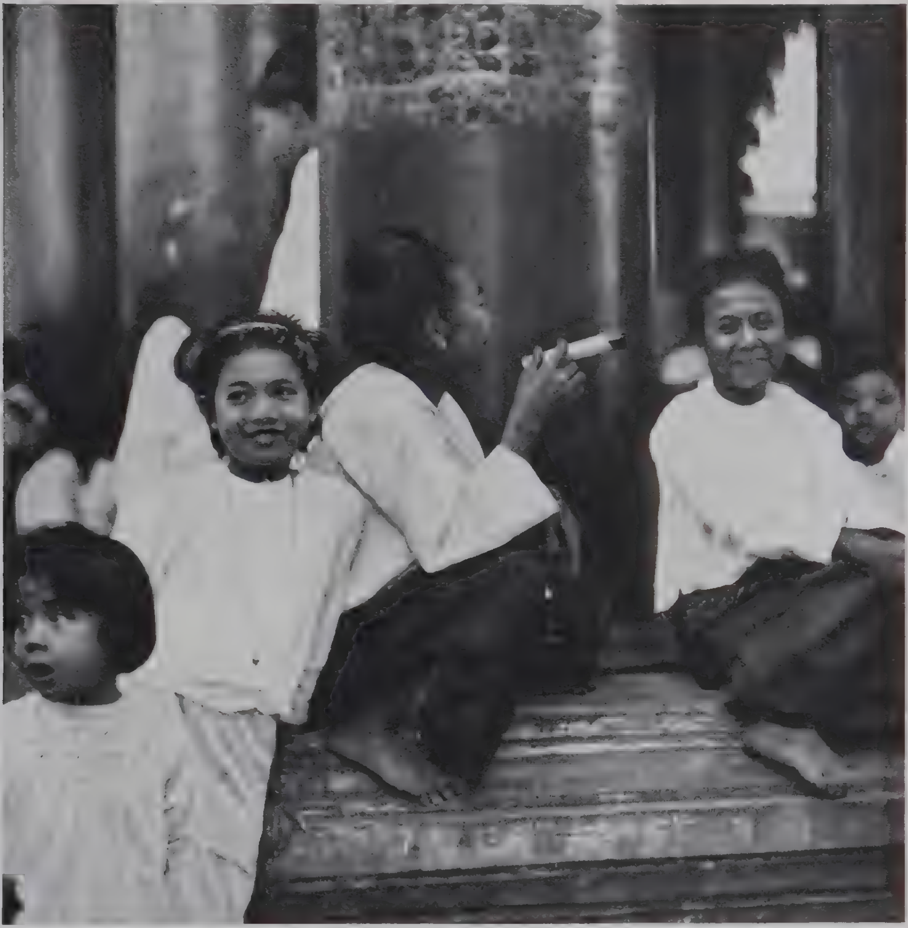
"That woman is in *purdah* and no man should see her," he replied, without denying that he did see her.

"I'm afraid she is not quite what I want, anyway," I replied. "But if she really desires seclusion, I think a Mother Hubbard would help a lot."

Women gladly consent to being photographed if they think they are well dressed, but woe to the photographer who attempts to take a picture of a woman in what she considers is not becoming to her!

FEMININE VANITY ON THE BANKS OF THE BRAHMAPUTRA

Our motor bus dropped down from Shillong to the banks of the Brahmaputra and stopped beside the little railway sta-



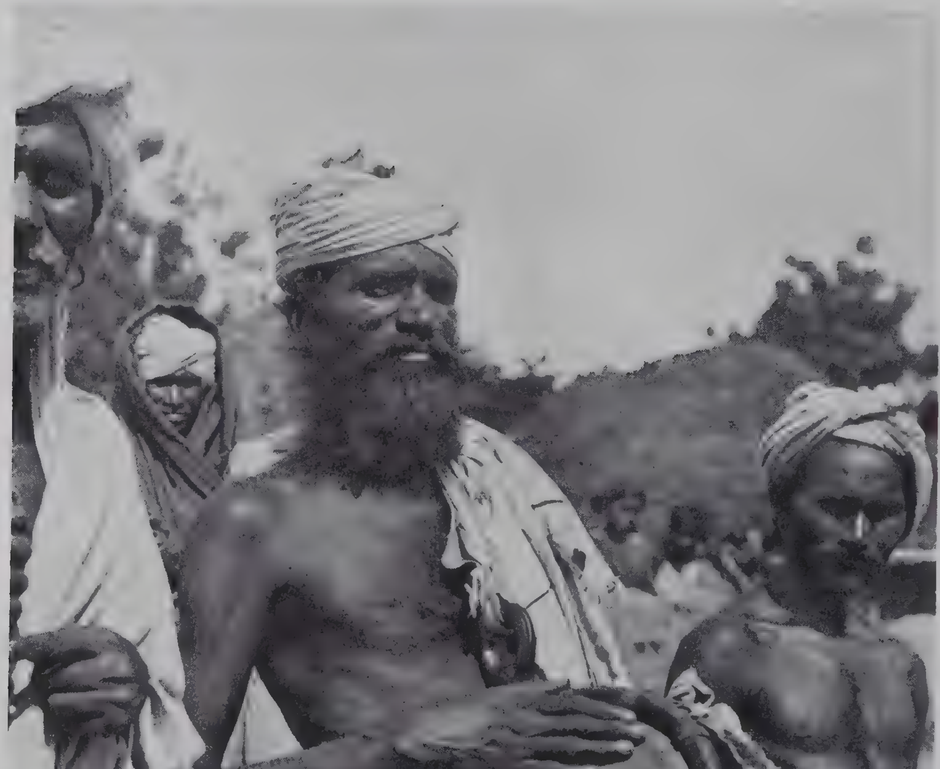
AT THE FOOT OF THE SHWE DAGON: BURMA

The famous pagoda at Rangoon attracts worshipers from all parts of the East, but at festival times the huge terrace from which the golden bell temple rises is the scene of gaiety. Impromptu picnics are held beside the many shrines which cluster about the main pagoda, a temporary stage is set up for the dances, of which the Burmans are so fond, and the big white cheroot demands a large place in the picture.

tion at Gauhati. It was to wait there for a few minutes before going on to the ferry crossing at Pandughat. So I shouldered my camera and went off to utilize the time. Seeing a very interesting old woman in the bazaar, I pointed to my camera and asked if I might take her picture. Her reply was to jump up with an alacrity surprising in one of her years and disappear into her home. Once safe in the shadow, however, she turned and signaled me to wait.

Down the village street, the motor bus soon turned the corner with a roar. Knowing that the Assam mails were in the body of the machine, and that time and tide set the tradition for the King's mails, I started away; but out from that doorway stepped my genial friend, proudly bearing up under the greatest weight of jewelry that I ever saw one woman wear.

While the mail waited and the motor horn honked, I took several pictures of the happy old lady, and then, with the last film wound from the roll, I snapped



A TELEGU MUSICIAN ACTING AS DRUM CORPS FOR A RELIGIOUS PROCESSION NEAR ONGOLE, INDIA

In the East the traveler is seldom out of earshot of some form of a tom tom to whose exotic tempo strangely dressed natives dance, march, or worship.

the shutter a half dozen times just to let her know that her kindness and fascination were appreciated.

USING A CAMERA IN JAPAN

Sometimes a photographer is embarrassed by official kindnesses. In Shiraoi, in Hokkaido, the Japanese were making a well-meant but vain attempt to inculcate into the Ainu their own love for bathing. As an aid to this object, they had built a bright new bath-house in the midst of the hovels in which the Ainu dwelt.

I was the guest of a Japanese official, and the right to take the official photograph of this auspicious occasion had been given to a commercial photographer. I had no desire to buy a formal picture of this group, in which the Japanese, clothed in Western dress, mixed with the fine-looking old Ainu chiefs and their wolfish-looking sons. I hinted as broadly as possible that I would like to secure some poses of my own, but all in vain.

One of the Japanese officials might be smiling or frowning or something, or his frock coat might not be buttoned properly, or his silk hat might not be held at the regulation angle, and an uncensored print let loose on the world might bring the Japanese Government and the Mikado into disrepute.

Until the ceremony was over, I was not allowed to take a single picture. But afterward I was at liberty to take all the pictures I desired, and secured a portrait of an Ainu Saint Nicholas which satisfied me better than would all the silk hats in Dai Nippon (see page 103).

THE SMILE TALISMAN IN CEYLON

A smile works in all languages and its power of reflection exceeds that of many a mirror. If this funny old world is ever to make friends with itself, it will be the face with the smile that wins. And to get a smile onto the face of an unwilling subject is not easy. Sometimes one has to resort to horse-play to get the people in good humor, and even when well-intentioned fun overshoots the mark, it is well to have established an atmosphere of friendliness.

One of the great prizes to the people of Asia is the tin container from which a film has been removed. These can be given away where money would introduce an undesirable element into the relations. But usually there are several claimants to the tin tube.

The tiniest baby is always entitled to first chance, but when the claimants are all of an age, I have had to decide by the ancient "eenie, meenie, miny, mo" method, and the result is usually great amusement and profound satisfaction by all concerned.

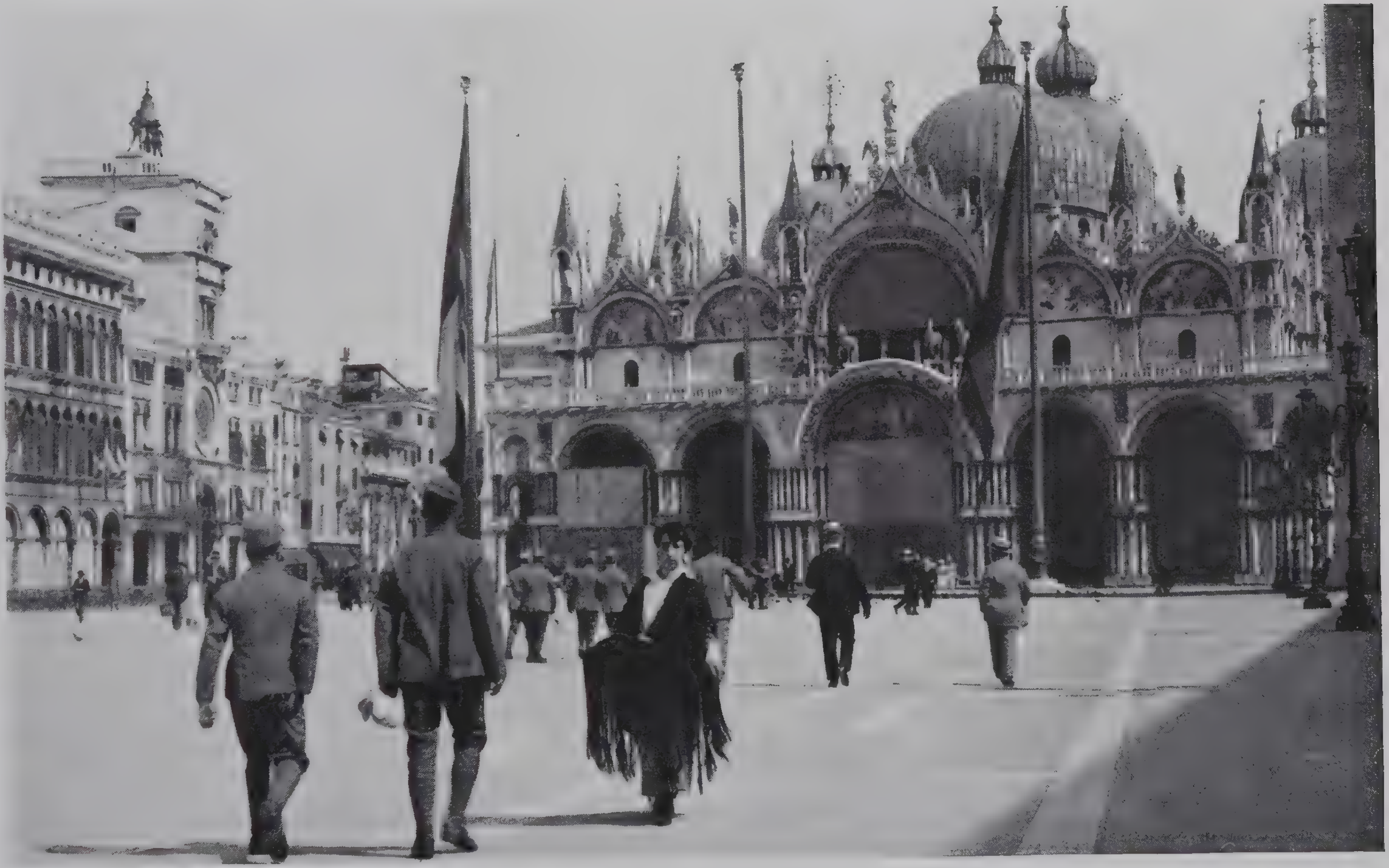
In Negombo, Ceylon, one small boy suggested that I throw the tube and let them scramble for it. That worked admirably the first time. But there was a small lad who seemed to lack strength or spirit and he gave signs of thinking that that was not a square deal.

All the boys were barelegged and I stood near the edge of a shallow pool. This small boy was nearer to the water than the rest; so, while pretending to throw the second tube ahead of me, as I had the first, I tossed it over my shoulder into the water. It fell quite near the disconsolate youth, but others were quicker. A more agile boy rushed for it and, stumbling over a guy rope, fell sprawling into the water.

WORKING AGAINST SUPERSTITIONS IN THE ORIENT

There was nothing for me to do but laugh as loudly as the rest, and when the boy picked himself up with the prize in his hands and a smile on his face, every one was happy. But I was glad that he did not wear a Little Lord Fauntleroy suit and a broad, starched collar, and that I had made friends with the crowd before the accident happened.

Throughout the Orient there are innumerable superstitions which make it difficult to secure personal photographs. Not only are Oriental men jealous of their women folk, but there are few places where the illiterates do not have some fear of the evil eye. Many fear misfortune if their picture is taken, and there are still Mohammedans who have a religious objection to lending themselves to the representation of living beings. A people who have made caligraphy their ideal of art do not readily lend themselves to portrait work.



"LA PIAZZA," REMINDER OF THE GLORY OF VENICE

Neither uniform nor deep-fringed shawl, straw hat of tourist nor gay pennons, can bring back the proud days before Vasco da Gama humbled the queen city of the Adriatic. But in the evening, when the pigeons have gone to perch under the rich arches of the great cathedral with its Byzantine domes, when the marble pavement is edged with tables and chairs, and a Venetian band is playing "La Paloma," the Piazza of St. Mark is a place which intrigues one's interest and inspires long and tender memories.

Many fear that if their photographs are taken their bodies will waste away. This belief is especially common among the Ainu, and some photographers have risked their lives because of their indiscretion in photographing those who are obsessed by such fears.

When there is a flat-footed refusal of the right to take pictures, one must desist; but ignorance of the language spoken by the people helps a great deal. Most people are shy about having their pictures taken, but this shyness quickly melts before a sincere smile, and when to apparent friendliness is added the pitiful spectacle of lingual helplessness, there are few who can refuse the respected foreigner's request.

A PHOTOGRAPH THAT REPRESENTS GRATITUDE

Many a Moslem husband has allowed me to photograph his women folk, and the toleration of these people in letting visitors see and photograph their mosque services is worthy of mention; but the most memorable case of Moslem magnanimity of my experience occurred in Ongole, where a Christian missionary had saved the life of an Indian Moslem's son, and this man, out of trust and gratitude, allowed me to photograph his family, with his wife unveiled, because I was a friend of the doctor (see page 106).

Throughout the East there is a hearty response to genuine friendliness. The native is not accustomed to familiarity with the white man and at first he resents it, because he does not understand the motives, but I have never met with anything other than the utmost politeness among the common people of Asia.

More troublesome than those who resent having their pictures taken are those superactive and ubiquitous imps who insist on being in every picture. One lad bothered me a great deal when I was trying to photograph a street scene in Buddh Gaya, India, though obviously he had as much right to the locality as did I. Since I could not remove him, I tried to get him to loosen up his frame a little and look more like Tom Sawyer and less like a monument. When I had shown him how to do it, and returned to my place, I turned to find him doing a scarecrow dance that would have won plaudits in the "Wizard of Oz" or done credit to Saint Vitus himself.

In the spring of 1919 the Chinese burned millions of dollars' worth of opium, not individually, in small doses, but collectively, in huge incinerators opposite Shanghai. At that time I was in the interior of Fukien, in the bandit-infested region between the Northern and Southern troops, and passed through wide fields of opium poppy which the people had been induced to plant so as to afford quick revenue to the war lords who were then ravaging the province.

A friend, to whom I mentioned my desire to get a photograph of this condition of affairs, said that if I attempted to photograph opium poppies the Chinese would probably try to destroy my camera, as they had no desire to be thus convicted of duplicity. I took a score of pictures in the poppy fields, showing the cultivation of the opium plants and the gathering of the milky juice from the poppy pods, but no one showed the slightest objection.

In Japan I met a man who was roundly condemning the Japanese for preventing foreigners from taking pictures and who was exceedingly surprised to know that, outside a few fortified areas, a camera can be as widely used in Nippon as in the United States.

He had attempted to take forbidden photographs at Nagasaki and had been so badly frightened by the police that he packed away his camera for weeks. Yet even in Nagasaki the government would gladly have furnished him a police officer, under whose surveillance he could have taken any legitimate views.

A RACY ENTERTAINMENT AT BEIRUT

While wandering around the waterfront in Beirut on one occasion, I saw a group of porters paying good money to look at a small peep-show which, judging from the laughter, was not of the most elevating variety. A little shamefacedly, I paid my *metalik* and looked at the exhibition.

I certainly got my money's worth, if side-lights on foreign life are worth anything. Four of the pictures were cover drawings from a popular American weekly magazine, with the full title left on and nothing added. A fifth was a foreign calendar issued by one of the shops of Beirut. It was a very racy entertainment for those barbaric burden-bearers, but there are few American mothers who would not have given such pictures to their five-year-olds.

Throughout northern India there wander Kashmiri musicians, usually with a young boy dressed in girls' clothes to dance to their exotic music. In Rawalpindi the native Christians were holding their Christmas entertainment outdoors on the campus, and a band of these musicians strolled up to watch the games and listen to the recitations and songs, such as a Christmas program produces in every corner of the world.

Their eyes glistened at this ready-made audience and the promise it gave for profit if they could only substitute barbaric music for hymns and sinuous dances for obstacle races; but the missionary tactfully explained that the program was already a long one—the Kashmiri was not familiar with Christmas programs—and that there would be no chance for them to entertain the Sunday-school scholars.

The wistfulness of those poor minstrels, standing outside that gay crowd, with presents being distributed and everybody radiant with the Christmas spirit, and being unable to contribute to the entertainment was a memorable sight. They seemed to feel as badly as a pickpocket would at not being asked to perform before a millionaire Sunday-school class.

THE TRAGEDY OF "THE" PICTURE

Out in Beirut, Syria, the day came when I secured THE picture. As soon as the shutter snapped, I knew that I had a wonder. In the dark room the plate surpassed my fondest hopes, and I think I dreamed that night of the wonderful picture which I had put out to dry on the window-sill.

With the coming of daylight I went to look once more at my treasure. The weather at that season was damp and the emulsion was still wet; but the picture was more beautiful in the soft light of early morning than it had been by lamp light. I shaved with a song on my lips. Deborah might have composed the words, if there had been any. Triumph rang from every note.

Then the sun rose over the Lebanon, whose lofty line, punctuated by snow peaks, faced my window. The quick warmth of the Oriental sun promised to dry the plate quickly after the muggy night. I went back to the window to gloat once more. The dream picture was a black smudge on the limestone ledge. Phœbus had glimpsed the beauty and had melted the emulsion on the plate like the wax on the wings of inordinate Icarus.

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VOL. XL, NO. 2 WASHINGTON AUGUST, 1921

THE NATIONAL GEOGRAPHIC MAGAZINE

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THE WILD LIFE OF LAKE SUPERIOR, PAST AND PRESENT

The Habits of Deer, Moose, Wolves, Beavers, Muskrats, Trout, and Feathered Wood-Folk Studied with Camera and Flashlight

By George Shiras, 3d*

Author of "Photographing Wild Game with Flashlight and Camera," "Wild Animals That Took Their Own Pictures by Day and by Night," "One Season's Game-Bag with the Camera," "A Flashlight Story of an Albino Porcupine and of a Cunning But Unfortunate Coon," "The White Sheep, Giant Moose, and Smaller Game of the Kenai Peninsula, Alaska," and "Nature's Transformation at Panama," in the National Geographic Magazine.

CHAPTER I

LAKE SUPERIOR is nature's greatest reservoir of deep, pure water in the world. Four hundred and fifty miles long, one hundred and sixty-seven miles wide, having a maximum depth of a thousand feet, its bottom four hundred feet below sea-level, with some two hundred tributary streams and the greatest snow precipitation east of the Mississippi, this great crescent-shaped basin has remained at the same level for centuries.

Overflowing, in a series of tumultuous rapids, the rock-rimmed shore at the eastern end, the excess waters have channeled out the beautiful Sault Ste. Marie River, with its wooded islands and many bays, passing thence through straits, rivers, lakes, and a great estuary to the sea, two thousand miles away.

PRIMITIVE ROCKS AND VIRGIN WATERS

The ancient formations of Lake Superior are grouped into three great divisions — the Archean, Algonquin, and Cambrian — each separated by unconformities of great magnitude. While of interest to the geologists, for here are the finest iron and copper deposits in the world, besides marble and granite, slate and sandstone, the basic divisions may be treated as rocks of crystalline and sedimentary origin.

Included in the latter is the "Lake Superior sandstone," unique in containing little or no fossil remains, indicative of its early formation.

The surfaces of the primary rocks are heavily scored by glacial action, while the overlying strata of sandstone, often many thousand feet thick, have been fashioned by the elements into fantastic and impres-

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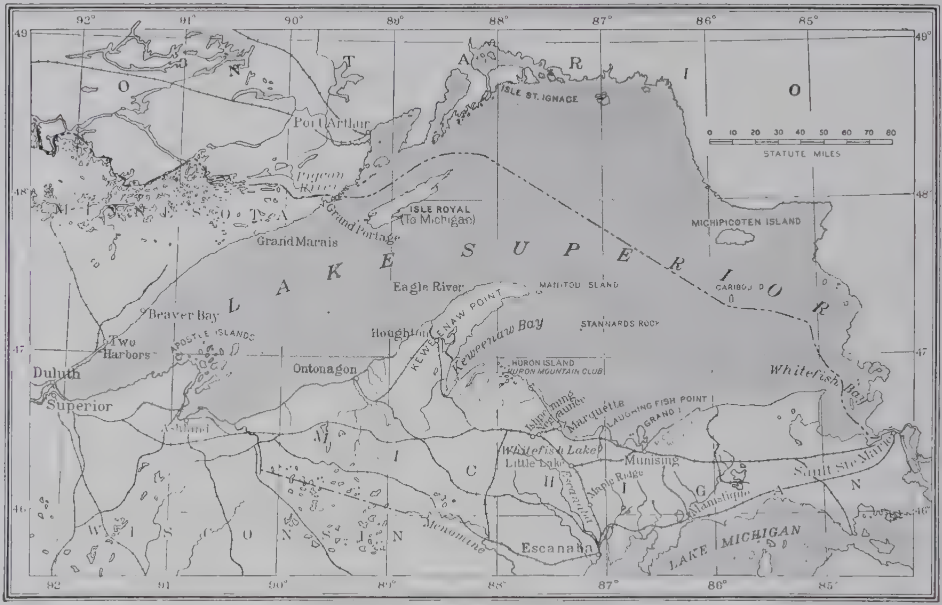
*In 1849 the paternal grandfather of the author visited Lake Superior to fish for speckled trout, at a time when there was only a scattered settlement or two, and before a lock had been constructed around the rapids at the head of St. Marie's River. In these vast waters he fished until his 89th year.

Then in 1859 came the father, as a fly-fisherman, later a Justice of the United States Supreme Court, who now, in his 90th year, continues his annual visits.

Finally came the author in 1870, who herein describes his own experiences of fifty years, first with the rod and gun, and then with the camera and flashlight, which brought to the sportsman and the naturalist a new pleasure and a new means of studying and photographing wild life.—EDITOR.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O N T A R I O
M I N N E S O T A
W I S C O N S I N
M I C H I G A N
LAKE SUPERIOR
Port Arthur
Pigeon River
Isle St. Ignace
Isle Royal (To Michigan)
Grand Portage
Grand Marais
Michipicoten Island
Caribou I.
0 10 20 30 40 50 60 70 80
Statute Miles
Eagle River
Manitou Island
Keweenaw Point
Keweenaw Bay
Houghton
Stannards Rock
Huron Island
Huron Mountain Club
Beaver Bay
Apostle Islands
Two Harbors
Duluth
Superior
Ashland
Ontonagon
Ishpeming
Negaunee
Marquette
Laughing Fish Point
Grand I.
Whitefish Lake
Little Lake
Munising
Escanaba
Maple Ridge
Manistique
Whitefish Bay
Sault Ste Marie
Menominee
Escanaba
Lake Michigan

Drawn by A. H. Bumstead

A MAP OF LAKE SUPERIOR SHOWING NORTHERN MICHIGAN AND WISCONSIN, EASTERN MINNESOTA, AND WESTERN ONTARIO

Among the points of interest mentioned in the narrative and indicated on the map are: Marquette, Whitefish Lake, Grand Island and Pictured Rocks, St. Ignace Island, and Stannards Rock.

sive shapes, resembling battlements and turreted castles, separated by high, perpendicular cliffs of variegated colors.

These cliffs contain caverns into which the larger craft may enter. One group on the southern shore is known as the "Pictured Rocks," originally the most famous of our natural phenomena, but now somewhat overshadowed by the magnitude and diversity of the Rocky Mountain region though still without a counterpart in coastal scenery (see pages 116, 117, 118, and 144).

In topography and scenic beauty the north shore resembles somewhat the southern shores of Alaska, for it is elevated, rock-bound, with many clear, turbulent trout streams cutting through the dark coniferous forests and plunging down the steep water-shed into the crystalline waters below.

WILD LIFE ON THE ISLANDS

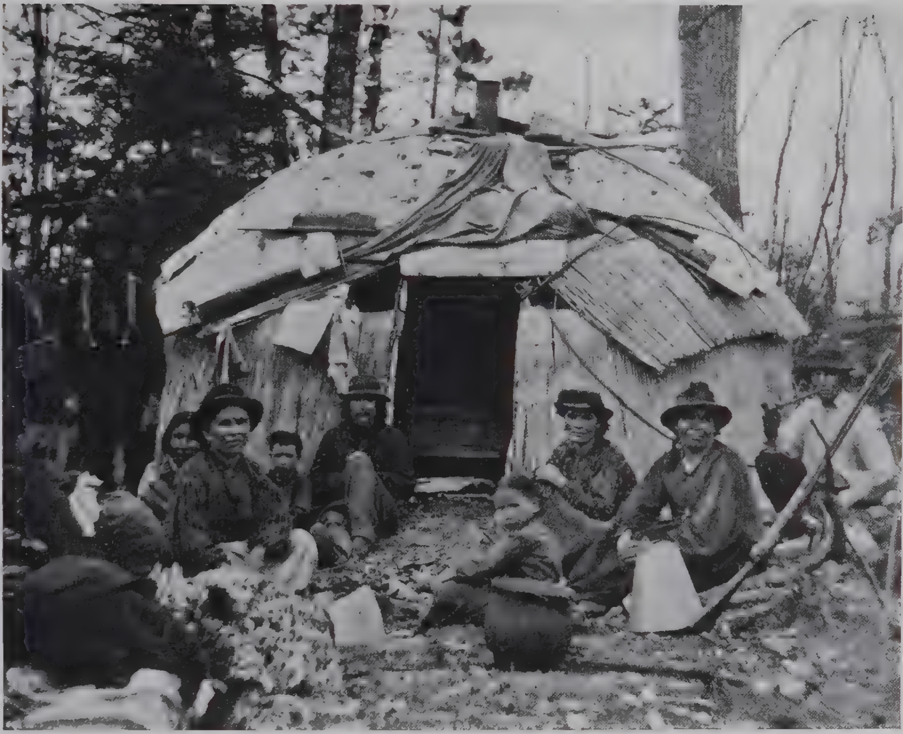
Here is also an archipelago of wooded islands, some surmounted by rocky domes of a thousand feet or more, the larger containing moose, deer, caribou, and bear, between which and the main shore are deep, tortuous channels and many safe harbors, affording ideal cruising grounds for the sportsman and tourist.

The south shore resembles more the northern Atlantic coast, with here and there precipitous cliffs and rocky promontories, separated by long stretches of sand beaches and deep bays, the islands and harbors infrequent.

PRIMEVAL FORESTS AND SUCCESSIVE GROWTHS

Circling the coast, the forests are much the same, except that the rotund spruce of Ontario is replaced on the Michigan shore by towering hemlocks, the roots of which turn the streams into a deep wine color; so that the speckled trout, in darker hues of brown, red, and orange, are in characteristic contrast with the silver and pink of those in the lake.

When travel by water was the principal means of seeing the lake country, it was assumed that upper Michigan was a vast pinery, for its shores and the interior streams were fringed with green through-



DOME-SHAPED LODGE OF THE OJIBWAYS

The Indian to the right is Chief Kawbawgam, who with his family lived on Presque Isle, now a suburban park of Marquette. He reached the unusual age of one hundred years, and now a large boulder is his monument in the park. The standing figure at the left is Jack La Pete, who acted as guide for four generations of the author's family. He died in his ninety-eighth year. Such longevity was most unusual among these Indians.

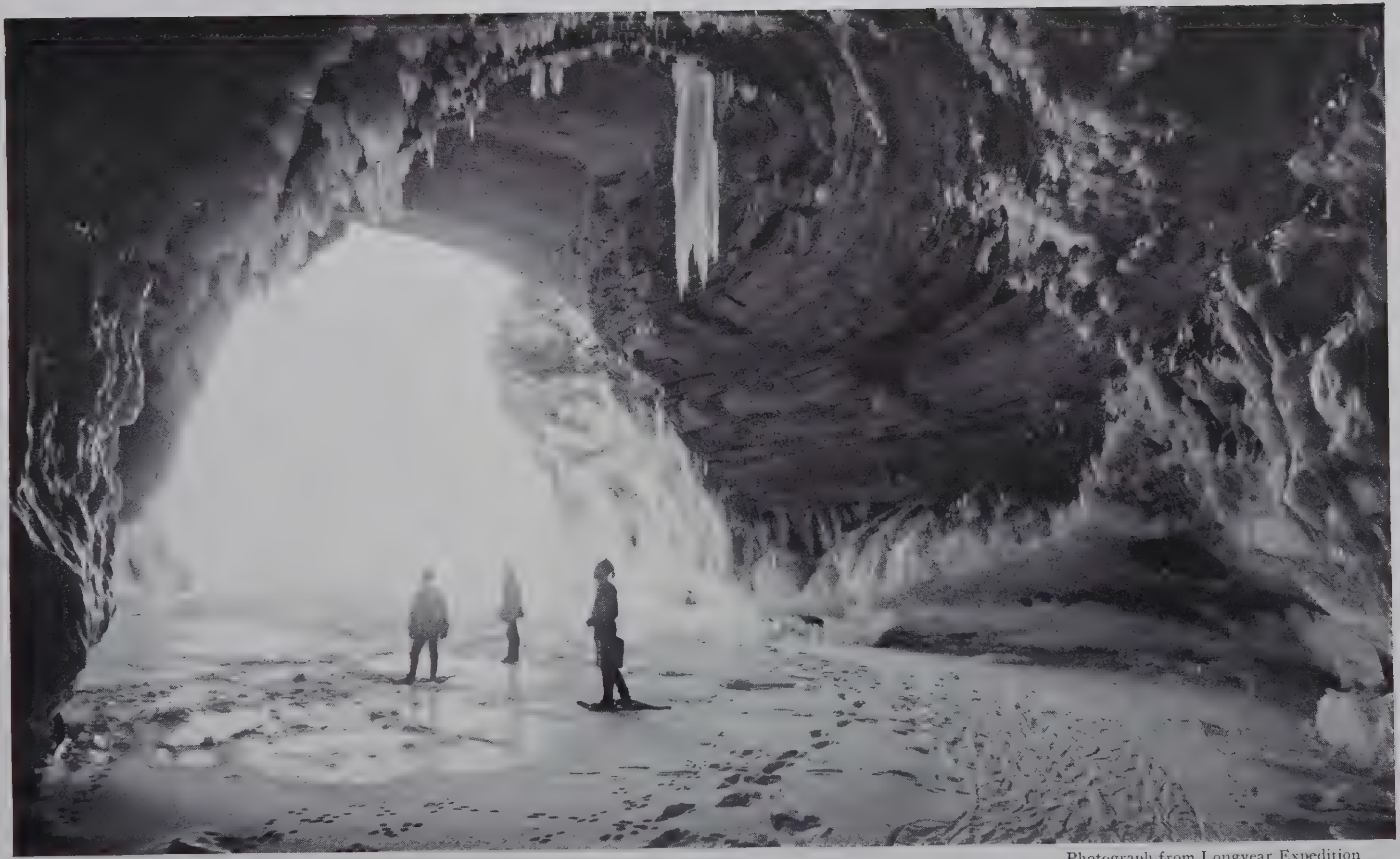
out the year, and visible in the open months were the buoyant pines floating down many streams to be rafted on the lake for the eastern market.

When the railways and the logging roads reached the higher ground, extraordinary forests of hardwood were discovered, consisting of millions of acres of sugar or hardwood maple in solid stands, with an abundance of beech, yellow birch, basswood, ash, and elm, resulting in the development of many woodworking establishments and the largest wood charcoal furnaces in the world (see page 122).

The abundance of sugar maples at the present time warrants a syrup production exceeding Vermont and New Hampshire, where generations of thrifty farmers have tapped every scattered grove in conserving nature's sweetest offering.

Nowhere, probably, on the continent is the fall foliage more beautiful in brilliancy or contrasting colors. Much of this gorgeous display is of recent origin, for with the removal of the older forests, the increase of rural clearings, and the unending vistas of the interior driveways came a second growth of low-branched, symmetrical trees, one of which, the soft maple, is spreading rapidly; for, when cut to the ground, from the stump springs a spray of green saplings, in the autumn turning to a fountain of pink and red, many of the leaves splotched like a painter's palette.

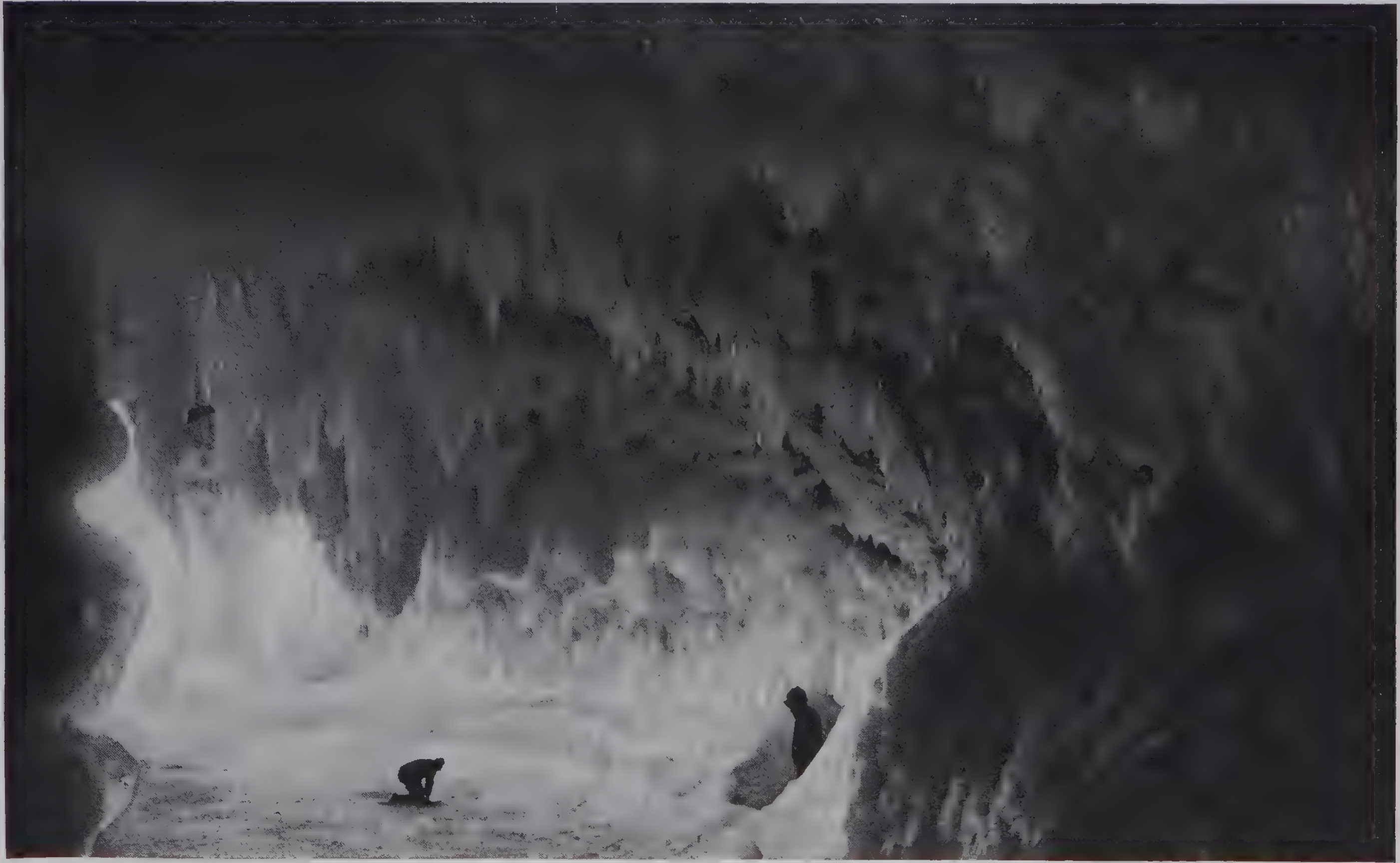
Equally abundant is the yellow-leafed poplar, fluttering in the slightest breeze, while the bronzed beeches and the lavender of the wild cherry are interspersed with the mountain ash, bending beneath



Photograph from Longyear Expedition

WINTER'S HANDIWORK: PICTURED ROCKS

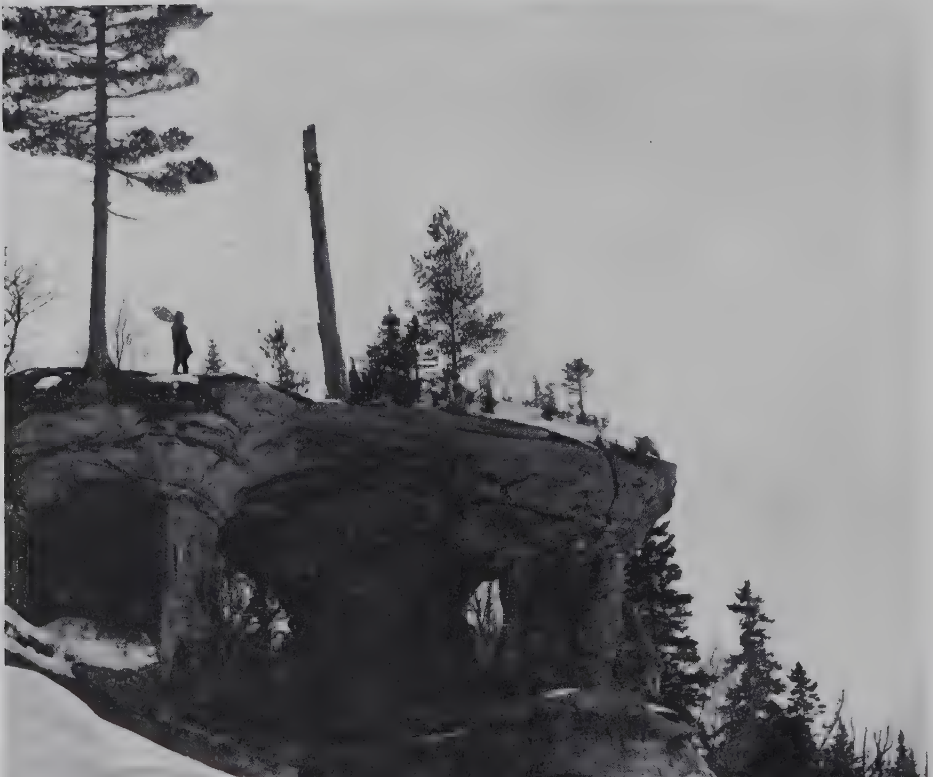
In the summer the transparent waters disclose the curved bottom of this rotund and gloomy cavern. When winter paves the floor in white, fills the lower crevices with ice, and forms pendant prisms on the arched entrance, the transformation is one of radiance and beauty.



Photograph from Longyear Expedition

GRAND PORTAL: PICTURED ROCKS

A winter view of a large cavern in the variegated sandstone cliffs east of Grand Island, where surging waves have formed a wainscoting of ice, and a myriad of stalactites on the domed ceiling. Occasionally the ice contents remain until July first.



MINER'S CASTLE: PICTURED ROCKS

With the base resembling Carrara marble, this striking design of Nature has been much changed in winter.

its clusters of red berries, the more brilliant hues alternating with the contrasting greens of the balsam and cedar, and back of which often lie great uncut forests of hardwood maple in a monotone of orange, the edgings carpeted with the crimson hether of huckleberry, while daisies, goldenrod, and giant ferns join in the culminating efforts of the ebbing year.

The interior lakes and ponds present the climax of this hectic season; for nature, flushed with intermittent frosts, duplicates its colors on the mirrored surfaces, all domed with the azure of the northern sky.

THE OJIBWAY INDIANS

Lake Superior was thoroughly explored and was a busy field for the Jesuit missionaries long before any other portion of the western country had been visited by the white man, for the hardy *voyageurs* used the great watercourse from the sea when settlements on the Atlantic coast were few and far apart.

In 1658 Radisson, the fur trader, gave the first written description of the south shore, followed in 1660 by Father Menard, in 1665 by Allouez, and in 1669 by Marquette. Some evidence exists for believing that this region was visited by white men long before these dates, it having been asserted by Chase S. Osborn, former Governor of Michigan, that so far back as 1542 Roberval's men penetrated thus far.

Among the first of the resident Indians on Lake Superior were the Ojibways, commonly called Chippewas. Belonging to the Algonquins, it is supposed they were driven west, along the Great Lakes, by the more warlike Iroquois, and on reaching the terminal waters found the Sioux, a tribe of similar habits and disposition, in possession.

Then ensued a bitter warfare; but the Ojibways, having a continuous supply of guns and ammunition from the east, drove their rivals out on the prairie country, where they became pony Indians, changing their habits materially.

The dividing line between these contending forces was Minnesota, the wandering trapper being able to recognize the different tribes by the tall, conical-shaped lodges of the Sioux and the low-domed ones of the Ojibways (see p. 115).

Hunting, fishing, trapping, and the use of the birch-bark canoe developed self-reliance and a habit of occupying more or less permanent locations within sight of the water, in contrast to the nomadic life of most western Indians.

THE INDIANS LIVED LARGELY ON FISH

In the early days there were neither moose nor deer and very few caribou, compelling the aborigines to live largely on fish, which were easily obtained from the Sault Ste. Marie River, where the rapids remained open during the winter, and here was established their largest village, bringing them into contact with travelers, whom they served as guides and packers. They were recognized as the most dependable and responsive members of their race, for early intercourse with the missionaries prepared them to welcome the white man as a friend.

At the present time the Ojibways have practically disappeared from the south shore, but are still to be found in considerable numbers throughout western Ontario and northeastern Minnesota, where the abundance of fish and game, supplemented by an annual pension from the United States and Canadian governments, favors their existence. Under conditions very similar to those of a hundred years ago, sportsmen and tourists are given an insight into the life of the tribe which inspired the story of Hiawatha.

CHAPTER II

FIRST OUTINGS TO LAKE SUPERIOR

In 1869 I was presented with my first gun, a small-bore, muzzle-loader, with which, under parental instruction, I was able to bag a few squirrels, quail, and rabbits in the wooded country below Pittsburgh, on and near the banks of the Ohio.

This gift was in view of a coming trip to Lake Superior the following year, where I was to be permitted to travel on ancestral trails to a region of hearsay, and to see with my own eyes this wonderful body of water and tributary streams, the great forests of pine and hardwood, the picturesque Ojibway Indians in their birch-bark canoes, and, more than all, the trout, grouse, wild pigeons, deer, bears, wolves, and many fur-bearers which tenanted the streams and arboreal retreats of a pristine wilderness.

Fated to continue on and on in this inherited privilege, half a century has now passed in a study of the wild life in a great homogeneous area, where the extinction or marked declination in certain forms have been compensated by the gradual appearance of species new to the region, accompanied by the gradual increase of some of the more valuable birds, animals, and fish so improvidently decreased in pioneer days.

Anxious to see the surrounding wilderness, a chance came to me when a family party started on a camping trip to the mouth of Huron River, fifty miles to the west of Marquette, a remote portion of the southern shore, where there was not a single habitation between the town and the camping place.

Transported by steamer to within five miles of the shore, several yawls, with canoes in tow, were soon under way. Passing the Huron Islands, dotted white with nesting herring gulls, among the first of the northern bird refuges to be established by President Roosevelt thirty-five years later, we landed in a small clearing near the entrance to the river, where the tents were erected, and then began ten most interesting days beneath the canvas.

INDIAN GUIDES OBJECTS OF INTEREST

The Indian guides were, perhaps, the object of greatest interest, for they gave much attention to the two young members of the party, whose incessant questions were only equaled by raids on the provision tent.

Trout, grouse, and pigeons were abundant and many deer tracks along the banks indicated what might be done in the hunting season.

Among the guides was one first employed by the writer's grandfather in 1850. His swarthy complexion and comical expression led to his being called Jack La Pete, through a supposed resemblance to the Jack of Spades (see page 115). Jack was small, thin, and active, with a volubility in striking contrast to the taciturnity of his race, a trait possibly due to a trace of Hibernian blood, for in other respects he resembled the Ojibway Indians.

During long contact with the better class of pioneers, who were intent upon the permanent development of a country rich in minerals and timber, and often acting as guide to those seeking to enjoy the abundance of game and fish, Jack became possessed of a greater knowledge of worldly affairs than any of his associates, and the fact that he had spent a year in Washington as interpreter in litigation affecting his tribe added further prestige.

About the camp-fire in the evening he made us little birch-bark canoes initialed with the quills of the porcupine, while the spreading tail of the grouse became a fan and the skin of a muskrat was made into a shot-pouch. In conversation he was equally active, and told many weird tales, including a personal interview with the great Manitou, who on one occasion came down the clay chimney of his cabin and with a mysterious incantation restored Jack's failing eyesight.

A NIGHT'S CAMP AT THE MOUTH OF DEAD RIVER

Being much impressed with the experiences of the first camp, three boy companions between the ages of nine and twelve were selected for a one night's visit to the mouth of Dead River, several miles north of town. The enterprise was to be undertaken without the assistance of guides or elders, so prone to interfere with the freedom of youth.

Marquette, like most early communities of the north, had no suburbs, and when one stepped out of the backyard, there began the domain of the wild, for the rigorous winters, deep snow, and lack of conveniences deterred any but Indians living outside the settlement.

Assisted up the beach by a one-horse wagon, the outfit was deposited beside a pyramidal rock where the river entered the lake, at which place there was plenty of drift-wood for a continuous camp-fire, axes being barred as well as guns, and, moreover, no one was to wade the shallow river on account of quicksands and because the pathless swamps and dense forests beyond were reported to be occupied by beasts having a particular preference for small boys.

The tent, when erected, leaned much to one side, in response to a crooked pole;

Photograph by George Shiras, 3d

FLASHLIGHT OF AN ALBINO PORCUPINE

For seven consecutive summers this animal was photographed at night in the same bay on Whitefish Lake. (See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," June, 1911, NAT. GEOG. MAG.)

but this was deemed a virtue, according to one of the party, because the sagging canvas would keep our feet warm, the coverings consisting of a single blanket each.

COOKING UNDER DIFFICULTIES

The remaining part of the day was spent in fishing, and after the trout were cleaned and an indescribable batter prepared for the flapjacks, it was discovered the lard and butter had been left behind. But burned fish and flapjacks pried off the frying-pan with a knife were not discouraging, for there was an abundance of jam, bread and cookies, and in the tent was a large beefsteak for breakfast, which, in the absence of grease, would now be broiled on a spit before the fire.

As dusk approached, a roaring sound came from the interior and gradually grew louder. The suggestion that it was a great forest fire sweeping toward the lake and would soon engulf us nearly sent the party scampering home, but the absence of either smoke or flame seemed to upset this prediction, and the mystery was left unsolved.

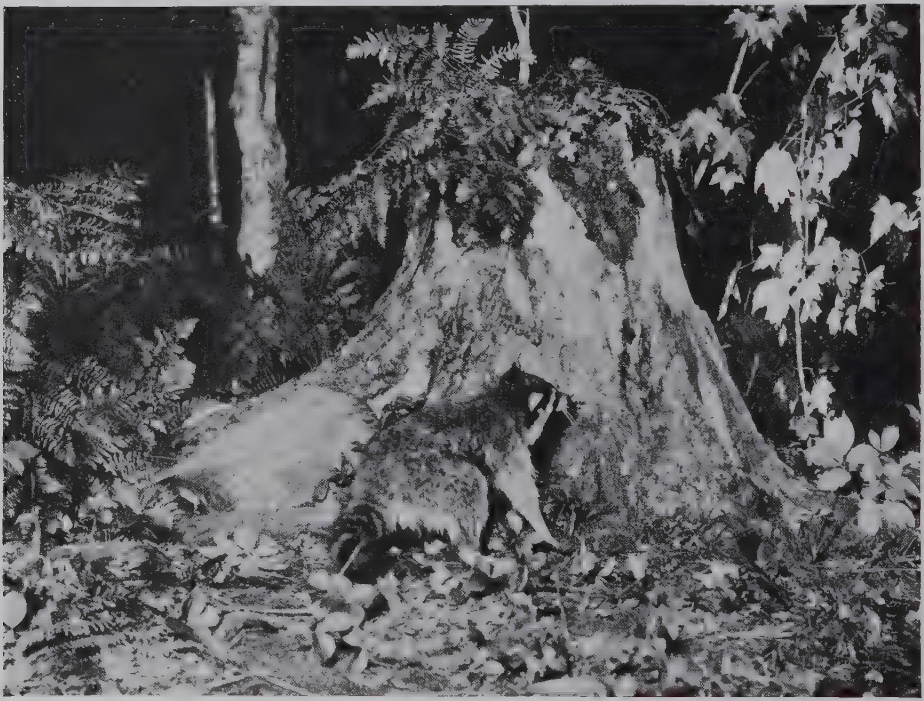
The wind, shifting from the lake to offshore, had brought in hearing the sound of some large falls; but such a simple explanation was not in the minds of youths about to spend the night in the region, growing more fearsome as the camp-fire accentuated the oncoming darkness.

It fell to my lot to occupy the front of the open tent, but as the warmth of the fire had advantages and the glare would keep away the prowlers of the night, I was soon asleep with the rest. About midnight the fire burned low, and to keep warm the blankets were drawn over the heads of each.

TERROR IN THE TENT

Suddenly I heard a snuffling sound beyond the tent, and then a couple of heavy feet pressed down on the blanket, followed by some animal seizing the package of meat and dragging it away.

Still enveloped in the covering, I man-



Photograph by George Shiras, 3d

A RACCOON FIRES THE FLASHLIGHT

Twenty-five years ago this omnivorous animal was unknown on Lake Superior, but on the coming of the second growth clearings and farming settlements it has taken up a permanent abode. (See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," June, 1911, Nat. Geog. Mag.)

aged to roll over the recumbent figures, shouting, "Bears! Bears!" until the closed end of the tent prevented further progress. Then there was a jumble of outcries and an effort made to occupy the same place in the rear, followed by the rapid firing of a revolver toward the opening by one of the party, who declared in excited tones that the prohibited weapon had been brought along for just such an occasion, for he knew we were in a country filled with dangerous animals.

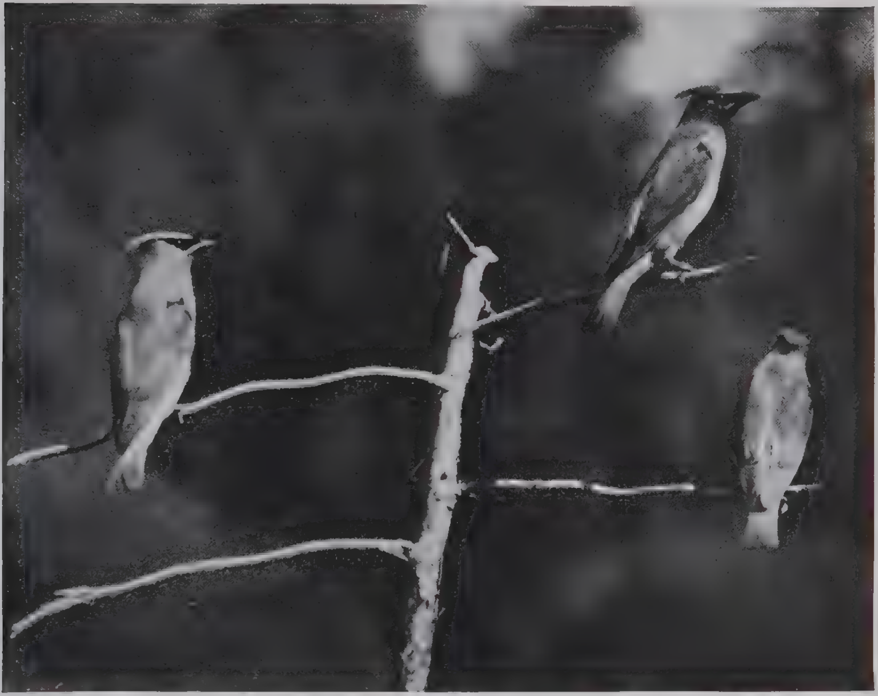
Under the protection of this weapon, the fire was replenished, and then at the edge of the swamp appeared the glowing eyes of wild creatures held at bay by the blazing logs, for the flittering fireflies above the moist ground were sufficiently realistic at this juncture to deceive all.

At daybreak the camp was abandoned, but not before large tracks were noted on the sandy beach. When each appeared at his respective home before any one had arisen, it was discouraging to be told that our visitor was, of course, only a stray Indian dog.

THE WORLD'S LARGEST CHARCOAL FURNACE

As showing how this particular camping place changed, it may be noted that the largest charcoal furnace in the world is now in operation on one side of the river, which is spanned by a steel bridge, and just beyond is the largest concrete ore dock on the Great Lakes, where leviathan freighters six or seven hundred feet long have replaced the birch-bark canoe. A shore driveway, with its multitude of automobiles, occupies the sand beach which once registered the tracks of many wild animals—and others not quite so wild, but equally fond of rare steak.

Early in August one of my youthful companions of the previous camp learned that two miles south of the town and



Photograph by George Shiras, 3d

CEDAR WAXWINGS NEAR THE CAMERA

In July, 1892, while watching for deer, cherry-birds were observed flying over the water after white millers. A stick with branches at right angles was placed near the blind and a camera, with a pulling string attached, was set up only three feet away from the perch. Soon a single bird was pictured; then two, and finally the three shown above.

several hundred yards above the mouth of Carp River was a salt lick much frequented by deer, for the valley beyond was a wilderness, visited only by a few trout fishermen early in the season. The animals came down the well-forested stream to the lick almost in sight of the highway following the lake shore.

Here, accompanied by a colored servant, he was placed on the top of a scaffold facing a salted log and within an hour had killed a deer, using a Martini-Henri carbine, the forerunner of the modern repeating rifle.

Then ensued great excitement among the boys of the neighborhood, and it was deemed a special honor when I was selected to try for a deer in company with the successful hunter, the exact location of the lick being unknown to the rest of us.

Several days later, on reaching the place, I found a high scaffold supported by four poplar trees and ascended by a rickety ladder, the general appearance indicating that it had been used as a convenient spot for killing deer by some one who found it unnecessary to go much beyond the town limits for his venison.

An old log had been bored full of auger-holes and filled with salt, so that each rain caused the salt water to overflow, keeping the lick continuously fresh. For about ten feet on each side of the log the trees had been removed, giving a full view of any animal standing in the opening.

A TRAGEDY AVERTED

By agreement I was to fire the shotgun first, followed by the carbine to insure getting the deer. Little time had passed when a twig cracked and both guns were trained on the log, ready for immediate action. Then a dark figure appeared and bent over the log, fortunately recognized, however, as a human being and evidently the proprietor, from the manner in which he examined the premises for signs of deer.

Had he looked skyward and seen the battery trained in his direction and the trembling fingers pressed against the triggers, he would doubtless have had some concern. However, he soon withdrew, and again we awaited expectantly, when, suddenly and without sound, a deer was seen standing on the opposite side of the log, with ears erect and nostrils twitching in an effort to detect any danger.

Counting three, the shotgun was fired, followed a moment later by my companion's, and then the animal whirled and was gone as silently as it came. Descending, we found that the deer had crossed the stream, and after trailing it some distance without finding any traces of blood, we returned much disappointed.

Just at dusk, on preparing to leave, a deer whistled near by, showing that so much tramping about the vicinity had given the needed warning. Much crestfallen and somewhat sensitive to my companion's declaration that had he shot first, there would have been a dead deer, I returned to town, wondering if such a favorable chance would ever occur again.

For more than fifteen years the State penitentiary, a huge brownstone building, has stood on the bank of the river just above where the lick was, and now some five hundred convicts gaze wistfully upon the still peaceful valley in which the unfettered creatures of the woods continue to roam.

THE DISCOVERY OF WHITEFISH LAKE

Several days later old Jack came shuffling along, looking for a job. When he heard of the unfortunate adventure with the deer, he told how he had discovered, two years before, a beautiful little lake away back in the unexplored forest, twenty miles east of his place, where deer were so abundant that one could be killed at any hour of the day or night.

Naturally, this excited my interest, and after further questioning I learned that in the summer of 1869 he had been employed as a mail-carrier by surveyors looking over a route for a railroad between Marquette and a point on Lake Michigan. When the preliminary survey reached a long, deep gorge, impracticable to bridge on account of the excessive cost, the project was given up.

Jack, however, noting the stream flowing through this valley and the possibility of finding good trapping ground for the ensuing winter, followed the gorge down until he came to a lake about a mile in length, where he saw many deer and much evidence of fur-bearers.

Later he built a half-way shelter at the head of Sand River and a larger one at the lake, where he had a season of successful trapping. Further, it was unnecessary in making this trip to carry anything but a couple of blankets, a gun, and a few provisions; for, besides the cooking outfit at both places, he had an abundance of maple sugar which could be used for tea or made into syrup for flapjacks.

THE BEGINNING OF FIFTY YEARS' VISITS TO THE NEWLY FOUND LAKE

During the second week of August, 1871, with my young brother as a companion, we were driven in a buckboard to an Indian cabin ten miles to the south, near the Chocolay River, where an uncomfortable night was spent on the attic floor alongside several aged and ogresslike squaws.

After a hasty breakfast the packs were adjusted according to the strength of each, and a start was made on a fairly good trail to the river, after wading which the course was determined by trees blazed the year before. The direction was easterly along a maple ridge interspersed with hemlock, where absence of undergrowth made the traveling easy, the few swamps having deer trails that avoided all mud-holes and fallen timber.

At noon the headwater of Sand River was reached, where the little lean-to of Jack's was to be occupied that night. The packs, light as they were, had told on the two very youthful members of the party.

While the lunch was being prepared, the sight of the little stream suggested trout, and much to the surprise of Jack we soon caught a dozen small fish. Like most Indians, Jack had a rather hazy notion about trout fishing in interior waters, since Lake Superior, filled with

Photograph by George Shiras, 3d

A MINNESOTA CONTRIBUTION TO THE SCENIC SHORES OF LAKE SUPERIOR

Minnesota, by reason of its climate, its woodlands and prairies, its countless beautiful lakes and connecting waters, has long been a paradise for wild life and a mecca for the sportsman and tourist. Owing to wise laws and a most efficient game commission, it stands in the forefront of progressive States. At some future time it is the purpose of this Magazine to portray at greater length the out-of-doors attractions of this commonwealth.

whitefish, lake and speckled trout, afforded such an ample and easily obtained supply by the use of the net, that the Indians rarely resorted to the rod.

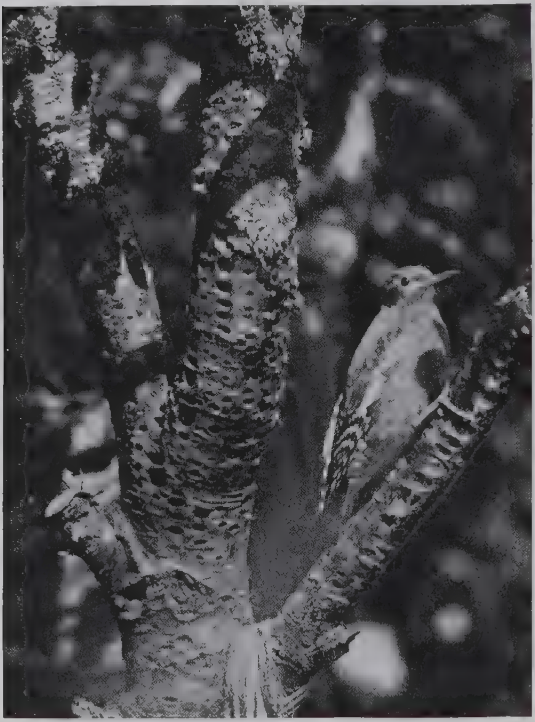
After the meal the possibility of maple sugar led to a search, when Jack, suspecting what we were after, lifted a heavy, flat stone from the edge of the shelter, exposing a tin can filled with pulverized sugar, the treasure being thus concealed because Bruin had a sweet tooth and otherwise would soon have detected this little store.

A STRANGE NOISE FROM THE WILDERNESS

Toward evening a strange noise came from down the stream, a confusion of bawls and whimpers, which Jack announced as the family bickering of an old she-bear and cubs. Seizing the shotgun, I announced a preference for bears and suggested that we proceed accordingly. Jack grimly rolled up a shirt sleeve, exposing a shriveled arm, deeply scarred, which he said was the result of a fierce encounter with a bear ten years before, and since he was responsible for our welfare, the bear hunt was off on this particular occasion.

Not until many years afterward did I learn how uniformly harmless was the black bear, even with cubs, and that Jack's misadventure was due to falling on top of a big bear asleep between two logs, and in an endeavor to escape the animal had seized him by the arm under the very natural impression that any one taking such liberties should be repelled by force.

Little time was lost in starting the next morning along a blazed trail leading to higher ground, through which an occasional glimpse of Lake Superior could



Photograph by George Shiras, 3d

YELLOW-BELLIED SAPSUCKER PUNCTURING A MOUNTAIN ASH

Many insects are attracted by the sweet fluid, furnishing food and a potion to the feathered proprietor.

be had an uncertain number of miles away.

In the final mile or so many deer runways were seen, all converging into larger ones leading toward the lake and each filled with fresh tracks of varying sizes.

Silence was suggested with a view to getting a shot, but Jack said that this was exactly what he was trying to avoid, as a deer killed away from camp meant delay and an unnecessary burden, and so he kept up a continuous chatter.

TYPE OF SHELTER THAT WAS OFTEN USED

At length a small clearing ahead indicated our goal, in the center of which appeared a type of shelter I had occasion to use in later years. It was shaped like a good-sized wall tent, having a narrow opening in the roof for the escape of smoke, with side walls of cedar logs extending up four feet and a double pitched roof of black ash bark.

There probably does not exist a more durable, waterproof, and easily prepared covering for a wilderness camp than black ash bark. The bark is removed from the trunks of the larger trees without difficulty in the spring, cut into sheets four by six feet, and put on, slightly overlapping. The sheets are supported beneath by cross-poles, while cedar strips along the outer surface prevent them from curling.

To one viewing the interior for the first time, the rich dark brown of the inner bark might be taken for a covering of well-tanned cowhides.

The birch bark in use for most Indian tepees along Lake Superior cannot be found in any virgin Michigan forests, for it is a second-growth tree in this region, as is generally the case elsewhere. Being inflammable and of a flimsy character, birch bark is not to be compared with the bark of the ash.

THE FIRST GLIMPSE OF WHITEFISH LAKE

On depositing our packs we were naturally eager to see the lake, lying concealed at the foot of the hill a few hundred yards away; but Jack declared the first thing in order was a meal, then the cutting of balsam boughs for the beds, ample firewood, and a general overhauling of the camp before the lake could be visited.

Finally all these preliminaries were over and we started down a steep slope for a body of water which, according to Jack, had been unvisited by any white man since the days of the Hudson Bay trappers, a hundred years before.

Interested as we were, could I then have anticipated what an all-controlling factor this little body of water was to play in the writer's destiny and that of his family, it would have been a much more memorable day.

A glance to the north disclosed a narrow lake about a mile long, heavily forested with pine and hemlock except at the end, where a semicircular growth of reeds backed by cedars and black ash indicated an outlet stream.

A look to the south disclosed a beautiful slough between high hills, and at the end reeds, water lilies, and sand beaches, through which ran the inlet stream, showing a gorge filled, as far as vision reached, with stately elms, beneath which grew the ever-present alders.

The view on page 192 shows the slough looking toward the lake, which is somewhat obstructed by a point, and on page 134 is the valley down which Jack came when he discovered the lake.

THE CENTER OF THE DEER COUNTRY

In this little slough and the adjacent lands the time was to come when more deer would be killed by market hunters and sportsmen than in any tract very much larger on the American continent, and, what can be stated with more pleasure, it was in this locality that the new sport of hunting with the camera was to be originated, and where more deer were to be photographed by day and by night than elsewhere throughout their entire range.

This was the center of the deer country. Several natural salt licks were located beneath each bank, forming the central points of century-old gathering places of all the deer within a radius of ten or fifteen miles. Here, at any time between spring and early winter, they could be seen almost continuously.

At the time of our first visit none of us knew of this unusual attraction, for from where we stood it was impossible to see the animals close to the bank, and it was not until years later that the muddy and trampled surface and the sight of the deer gulping down this saline mixture indicated the presence of mineral springs, shown by analysis to contain a higher percentage of salt than many of the commercial salt wells in southern Michigan.

While we were intent on noting the surroundings, Jack pulled from beneath the alders what looked like a log, but when turned over proved to be a dugout made from white pine and containing a paddle and a gill-net.

Although made for only one person and used for trapping, we were all such light weights the boat was deemed large enough to carry two of us when hunting.

Jack soon made another paddle from a dry piece of cedar, and then, according to the rules of primogeniture, I was to go on the first hunt, the lower end of the lake being selected. Before starting, I asked why the slough, with its many runways, was not the best place to watch, and was told that this locality was reserved for fire-hunting that night, in case we had no success in getting one before dark.

Leaving my brother to find his way back to camp, we paddled slowly along the western shore toward the reeds and shallow waters, where Jack predicted it would take but a few minutes to get a deer.

Suddenly he whispered, "Put up your paddle. There is a deer ahead."

But I could neither see nor hear one. Passing some reeds bordering a little bay, I saw, standing within less than thirty yards, a small buck, intent on obtaining the succulent water grasses growing a few inches below the surface.

THE FIRST SHOT

Silently I raised the gun, aimed for the shoulder, and as the black smoke and heavy report evidenced the pulling of the trigger, the deer gave a spasmodic whirl, rushing toward the shore at an extraordinary speed, the water flying in all directions. Once more the gun was discharged, just as the animal, in a single leap, cleared the bushes and disappeared in the cedar brush beyond.

Reverberating echoes from the high ground across the lake did not conceal Jack's chuckle; but he gave assurance of another shot within an hour.

"Another shot!" What a mockery this seemed to one who felt sure that this time the effort had been successful; and, if not, what chance would there ever be of doing better? Therefore, with assumed confidence, I insisted that we would find the deer dead within a short distance. But Jack only laughed and steered the boat toward the opposite shore, for it was evidently his opinion that "buck fever" had given this animal a further lease of life.

After several hours had passed with-

Photograph by George Shiras, 3d

AN ANCESTRAL RUFFED GROUSE

In the fall of 1892, on approaching the author's camp clearing, a cock grouse, clucking and spreading its tail on a branch beneath a wild cherry tree, was pictured with a small hand camera.

out our seeing anything further, we returned to camp, and, following supper, preparations were made for fire-hunting, under the primitive conditions employed by the Indians, it now being my brother's opportunity to provide the venison.

At dusk we went down the winding trail, illuminated by a flaming torch of birch bark from material brought in for this purpose. Placing an old frying-pan in the bow of the dugout, containing a handful of pine knots, with strips of bark near by, to be added when more light was needed, a start was made, and I returned to the camp, which was hardly reached before there came the crack of the gun.

THE AUTHOR'S BROTHER GETS HIS DEER

After a while the glare of the approaching torch showed Jack leading the way, carrying several pickerel taken from the net at the entrance of the slough, while my brother had the gun in one hand and in the other a stick upon which were impaled the heart and liver of the deer, showing the success of the hunt.

Then came the account of the dugout passing along the slough, when the sound of several deer trampling about in the mud led to the turning of the canoe in that direction, where two pairs of shining eyeballs indicated a choice of victims. When about fifty feet away the luminous eyeballs disappeared and the two animals could be seen looking across the water. Selecting the smaller of the two, it went down without a struggle, and at the landing it was soon dressed and hung up that it might be drained of blood.

During the night I resolved to arise at daybreak and, without disturbing the others, seek the place where my deer had gone ashore, with the vague hope of finding it or, if unsuccessful, to try for another animal single-handed.

THE QUARRY FOUND!

Never having paddled in the stern before, a few strokes were taken on one side and then on the other, and in this slow and clumsy fashion the bay was reached. Here the dried mud on the leaves gave the clue; so, pushing the bow of the boat into the bushes, I leaped clear of the muddy edge, seizing a projecting snag for support. But the snag proved to be the hind leg of my deer!

Sinking down, trembling with emotion, I eyed the crumpled body of the little buck. Had a humanitarian witnessed the scene it might have looked like contrition over the destruction of a beautiful and innocent creature, but the time had not yet come when the camera was to be substituted for the gun in my big-game hunting.

After recovering somewhat, an examination showed that nine buckshot had passed entirely through the body, piercing both heart and lungs, thus giving an illustration of how far a deer will occasionally run when mortally wounded. But unknown then was the fact that most deer indicate by their actions the effect of a shot; for when missed they bound away gracefully, with the head erect and the white tail aloft, as though giving a farewell salute to the disappointed hunter, whereas on receiving a deadly wound they usually run rapidly instead of bounding, with the head lowered and the tail down, wringing it spasmodically from side to side. To the inexperienced hunter it is, therefore, of prime importance that he note carefully the action of the animal after a shot.

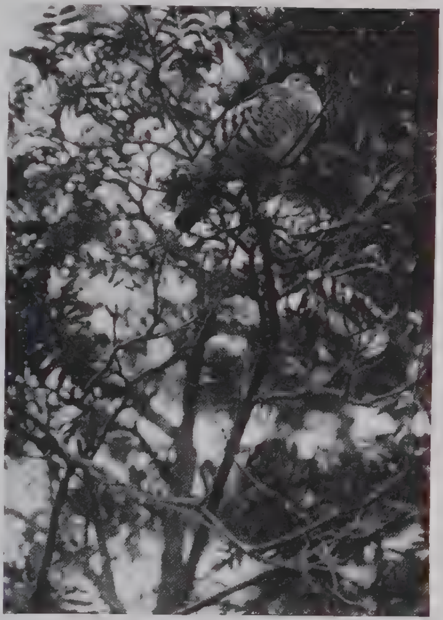
In dragging my deer through the bushes the stiffened limbs caught, and a heavier pull landed the hunter and the animal in the deep mud, making it a difficult task to get the bedraggled trophy aboard.

On nearing the end of the lake, my triumphant shouts aroused the sleepers, who hurried down the hill in the belief that the strangely absent member had gotten into some kind of trouble. But the sight of the dugout and its muddy occupants told the story of the clandestine and successful trip.

THE DEER MEAT WAS CAREFULLY CURED

During the day the meat of the two deer was partly dried in strips before a hardwood fire, and the day following this task was completed, so reducing the weight of the carcasses that all the edible portions were carried home—a lesson in conservation never lost. In later years I was to witness millions of pounds of meat left in the woods each fall by wasteful market hunters, who shipped out only the saddles, leaving the remainder to rot.

During the succeeding ten years, this trip was repeated often, being made each way in a single day, extra packers accompanying the hunters, so no meat would



GROUSE DOZING IN THE SUN

Crop filled with mountain-ash berries. A two-years' closed season, 1918-19, increased these birds beyond any previous numbers (see page 150).

Photographs by George Shiras, 3d

GROUSE IN MOUNTAIN-ASH TREE

On October 1, 1920, the opening day of the hunting season, several grouse were seen feeding on mountain-ash berries and their pictures were taken before a hunter appeared.

be wasted. Finally, in 1881, a railroad was constructed between Marquette and Sault Ste. Marie, passing half-way between Lake Superior and the camp, making it readily accessible (see pp. 188-9).

As I write, the fiftieth consecutive year has passed, during which longer and more frequent visits have been made, many of them recorded in subsequent pages. Seldom has a wilderness camp in this country retained its primitive attractions of forest and wild life so long. During this time many States, then unorganized in the West, have lost a large share of their once abundant game.

CHAPTER III

THE WHITE-TAIL DEER

The white-tail or Virginia deer has a wider distribution on the continent than any other antlered animal, and is likely to continue indefinitely, in many places increasing under suitable laws, aided by its wonderful capacity to adapt itself to changing conditions. It is the favorite big-game animal among sportsmen of America, for the meat is palatable, the antlers symmetrical and attractive, while its cunning becomes an additional incentive to those whose real enjoyment lies in the exercise of skill and persistence in hunting.

Animals like the moose and elk are seldom killed by sportsmen after one or two sets of antlers have been secured; for the great bulk of these animals, the difficulty in saving the meat in remote places, and the ease with which they are shot deter annual hunting, whereas the white-tail, much less in weight and usually within reach of transportation, is sometimes hunted by a sportsman for thirty or forty consecutive years.

While the writer has had an extended experience with various species of white-tails throughout most of the range of this group of deer, from Central America to near its northern limits, the present narrative is confined to those of the Lake Superior region.

The white-tail, while now quite abundant, was unknown on the north shore at the time the writer came to the region, in 1870. Moreover, there were few within a mile of the south shore, due largely to the ever-present Ojibways, so aptly called "Canoe Indians," who during the summer camped at the mouths of nearly all streams and other places apt to be frequented by deer.

DEER SPENT SUMMERS NEAR LAKE SUPERIOR

But when the country to the south began to be settled most of the deer spent the summers near Lake Superior, stopping first about the small interior lakes and headwaters of the numerous streams where the Indians seldom went before winter.

The writer's early visits to Whitefish Lake illustrated these conditions. The fact that approximately eighty thousand deer were killed each year of 1879, 1880, and 1881, and most of these within ten miles of Lake Superior, shows their extraordinary increase later. Since that time there has been a gradual and steady decline, largely on account of the great increase in hunters and the convenient method of reaching places previously inaccessible.

Every summer and fall, I spent a portion of each week at least with young companions camping on the south shore, traveling usually in a big, staunch rowboat, with a canoe often in tow. Trout fishing was of the best along the open waters, many of the fish being of great size. In the streams were brook trout, so often preferable for the frying-pan, while wild pigeons frequented the burnt-over clearings near the shore, unprotected by law at that time. Grouse were numerous in the same localities.

Whenever the camp was near a small lake, the canoe was carried over, and during the day a deer could generally be killed.

In the course of time all the well-wooded bays and sheltered points for more than a hundred and fifty miles were visited, including each lake and pond and every stream where fish or game abounded.

HEAVY GALES UNKNOWN ON LAKE SUPERIOR

In this long period only once or twice was the party windbound for more than a day and at no time in the slightest peril from wind or waves, showing that this, the greatest of all lakes, is peaceful and dependable beyond compare.

A FINE STRING OF SPECKLED TROUT

Catches such as the above were not unusual in Lake Superior prior to 1885. Average of above fish was 4½ pounds. Fishing in the mouths of all the spawning streams during the month of August accounts for the great decline in numbers (see page 155).

Heavy gales can neither continue nor develop on Lake Superior, as shown by the fact that the maximum wind velocities seldom exceed 40 miles an hour. Not only is this remarkable record in striking contrast to the tornadoes of the Middle West and the hurricanes frequently reaching the Atlantic coast, but likewise in the case of many populous communities.

Here the Weather Bureau figures confirm the writer's conclusions. During a five-year period (1911-1915) the wind on 156 days reached or exceeded 40 miles per hour at Duluth, and in the same period a similar velocity was reached only 21 times at Houghton, 46 at Marquette, and 33 at Sault Ste. Marie, showing that the heavier winds subsided when they reached the lake, and that this vast area of water, instead of breeding gales or accelerating the land winds, had the opposite effect.

Moreover, the heaviest wind at Duluth in 47 years (1873-1920) was 78 miles per hour, in September, 1881, and this was very exceptional, while the highest velocity at this period for Houghton was 60 miles; Marquette, 62, and Sault Ste. Marie, 61—substantial proof that Lake Superior is free from heavy gales. Contrast such a record with the following stations, many of which cover a lesser period:

Mobile, Ala., 115; Buffalo, N. Y., 96; Mount Weather, Va., 110; Charleston, S. C., 96; New York, N. Y., 96; Fort Canby, Wash, 104; Hatteras, N. C., 105; Pensacola, Fla., 120; Key West, Fla., 115; St. Paul, Minn., 102; North Platte, Nebr., 96; Galveston, Texas, 94; Kitty Hawk, N. C., 100; Point Reyes, Calif., 120.

SHIPWRECKS ARE ALMOST UNKNOWN

However, when moderate winds prevail for several days along or across this vast body of water, one may see, under blue skies, great white-capped rollers dashing against the black volcanic rocks or surging high up on the beaches; but no reasonably staunch passenger steamer has ever been sunk on Lake Superior by reason of wind or waves, though occassionally some of the large freight carriers, when the shore and reefs are shrouded in a fall snow-storm, have been wrecked within the narrowing outlet of the lake; and again, on very rare occasions, an ore-boat, with decks awash, carrying an immense tonnage in its long, steel hull, has developed a structural weakness in a rolling sea and gone like a plummet to the bottom.

Loss of life in launches, sail-boats, or lighter craft has been negligible, and it is doubtless true that on many a small, interior lake or tidal bay there have been more casualties in a single season than during a century on Lake Superior.

MARKET HUNTERS KILLED 150 DEER A SEASON

Other trips were often made into the interior, where chains of lakes offered a change of scenery and of methods of hunting, including always a visit to a little camp near Whitefish Lake. The experiences gained in such widely separated parts of the region were later much enhanced when the camera allowed a longer and better opportunity for studying wild life.

The market hunters seldom killed less than a hundred and fifty deer a season. One hunter happened to locate his camp a few miles south of Whitefish Lake, where almost as regularly as the clock a horse in charge of an assistant passed each morning loaded with saddles of venison, to be shipped by express to Detroit or Chicago, while the remainder of the carcasses were left to rot.

This slaughter in the neighborhood continued for five seasons, with an estimated total of over four hundred deer to one gun. Then a ban was placed on the sale of venison and the killing fell off for a while.

When reference is made to the seasonal migration of wild creatures, we usually have in mind a large class of birds which every year go to and return from the breeding grounds in the north. Certain fish, like the salmon and shad, are migratory, as is the fur-seal and also some insects, including certain butterflies, but among the game mammals of our continent only the buffalo and caribou may be regarded as true migrants.

However, some species of the deer family, such as the elk and mule deer of the Rockies and the moose of Alaska, ascend regularly in the spring to higher

Photograph by George Shiras, 3d

TIMBER WOLVES POISONED ON WHITEFISH LAKE

Next to man, these animals are the most destructive foe of the white-tail deer in the upper lake region. Fourteen years ago, during a severe winter, when deep snows were crusted for several weeks, the wolves destroyed nearly all the deer within a ten-mile radius of Whitefish Lake. From the carcasses found it was estimated that over two thousand deer were killed in this limited area. A deer's fear of a wolf is only equalled by a wolf's fear of man (see pages 160-166).

grounds for better food or to escape insect pests, returning again when deep snows or killing frosts make the lowlands preferable.

But such movements, though well defined and participated in by hundreds and sometimes thousands of animals, are altitudinal and not latitudinal, and therefore not deemed migratory in the accepted sense, because they may travel to the north, east, or west in their ascent or descent each year, and this usually occurs when retreating or increasing snows regulate their movements.

With the true migrant the condition of the prevailing temperature, either in the spring or fall, has little to do with the migration, however much it was the original cause, for birds of many species travel at about the same periods each year, regardless of any then-compelling necessity.

DEER CHANGE THEIR MIGRATION HABITS

On the south shore of Lake Superior, including all of northern Michigan and Wisconsin, there once existed a spring and fall movement of the white-tail deer which possessed all the characteristics of a true migration. As this habit was abandoned more than thirty-five years ago, after continuing, doubtless, for centuries, it is worthy of record, especially in view of the fact that those who were

Photograph by George Shiras, 3d

WHERE ANIMAL FLASHLIGHT PHOTOGRAPHY HAD ITS BIRTH: THE SLOUGH AT THE END OF WHITEFISH LAKE

In this small area more deer were killed, and later more photographed by day and by night, than in any similar locality on the continent. Natural salt licks were one of the attractions. This picture shows the method of taking daylight pictures by means of a string running from a seat in a tree to a camera on the beach. Whenever a deer was passing within range of the camera a sharp whistle stopped it, and then a pull on the string recorded the scene. A number of such pictures appeared in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1906. The figure of a deer may be discerned in the background.

familiar with it are fast departing or have never understood the unusual character of this migration when compared with the habits of the white-tail in its other widely separated ranges.

Early in May, as soon as the depth of the snow permitted travel, thousands of does worked their way north, traveling alone into a broad belt along the south shore of Lake Superior, where a few weeks later the fawns were born. The bucks came more leisurely, but by early June the migration was over.

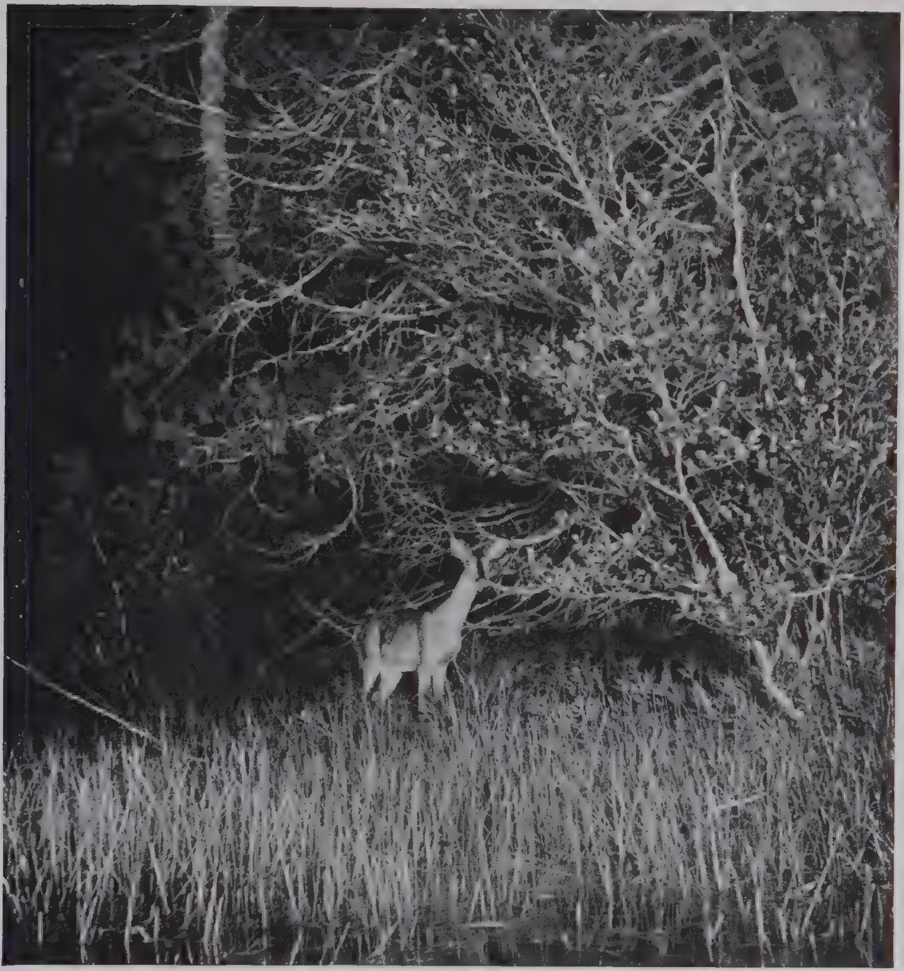
On the coming of the first heavy north winds, accompanied by a light frost, sometimes as early as August 15, the does, fawns, and yearlings started south, and by September thousands were on their way, regardless of the fact that no snow would fall for six weeks and none deep enough to interfere with the food supply or freedom of movement for more than three months later.

In October most of the bucks had gone, and I well remember my old guide, Jake Brown, who for many years wintered in the vicinity of my camp, telling me, on more than one occasion, that if he "didn't get his venison under the snow by Thanksgiving Day" he "would not have a chance again before the middle of May."

In a few instances it was known that deer yarded, trying to winter near the lake; but they were promptly killed, either by the wolves or the Indians.

SNOW MAY HAVE CAUSED ORIGINAL MIGRATION

Doubtless the great depth of snow in this region was the original cause of their fall migration, until it had finally become so fixed by inheritance that long before there was any apparent necessity the retirement took place. In twos and threes they traveled southerly on many trails



Photograph by George Shiras, 3d

THE FIRST SUCCESSFUL FLASHLIGHT OF A WILD ANIMAL EVER MADE

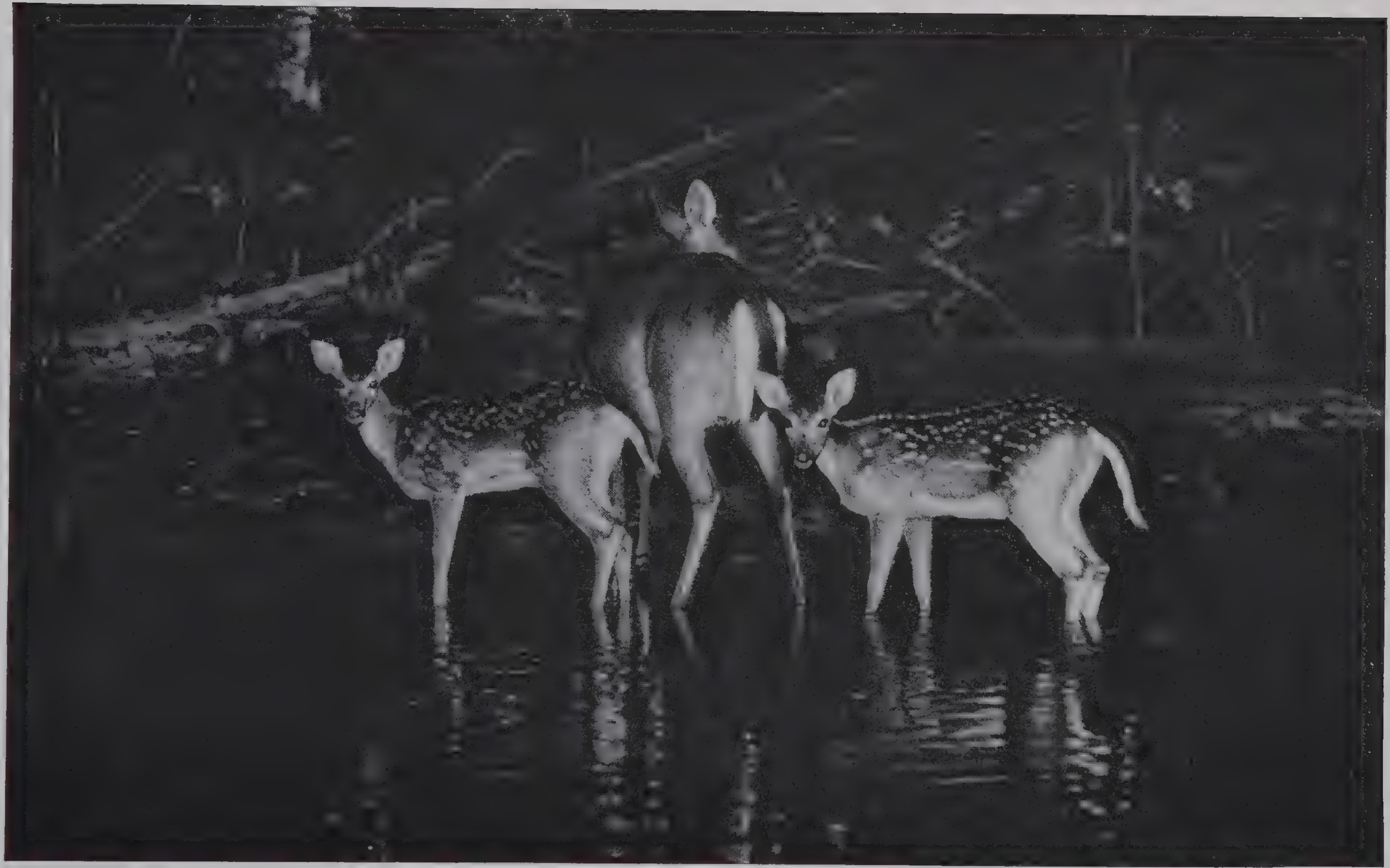
This yearling buck, with head erect and facing the jack-light, was the first satisfactory subject for a picture obtained by the author in his invention and development of night photography (see pages 175-176).

which by centuries of use had become about two feet broad, clear of obstructions and deeply cut in banks and soft ground. In swamps they were like caribou trails in Newfoundland.

These migrating deer always traveled with the wind and never against it, and always in the daytime, usually between 7 and 4 o'clock. It is interesting to note how this compared with the migration of the caribou in Newfoundland, where I spent two seasons studying it. There, too, the cows, calves, and yearlings began moving south about the 15th of August, but usually in bands of a dozen or more, followed by the large stags later, and, like the deer, they traveled in the daytime, but always against the wind except during severe weather, at the end of the season.

THE CARIBOU DEPENDS ON SCENT

It is characteristic of the caribou to depend upon scent rather than sight or hearing, and this is especially true of the Woodland caribou of Newfoundland, which,



Photograph by George Shiras, 3d

"INNOCENTS ABROAD"

A flashlight photograph of a doe and her twin fawns, taken from a canoe, on the eastern shore of Whitefish Lake, nearly thirty years ago. This picture, with the frontispiece and the two on pages 138-139, were the first to indicate the possibilities of the camera at night. The group mentioned was exhibited by the United States Government at the World's Fair, Paris, 1900, receiving the Gold Medal, and at the World's Fair, St. Louis, 1904, receiving the Grand Prize.

migrating south in bands, have learned, through generations of experience in this oldest of English colonies, that danger always lies ahead; for concealed along the line of the trans-island railroad or in the passageways between numerous lakes are hundreds of hunters, mostly erstwhile fishermen, out for their winter's meat, with here and there an English or American sportsman in search of an antlered trophy. Headed against the wind and in a more or less open country, the telltale scent gives warning a long distance in advance.

On the other hand, the white-tail deer, traveling south alone or with the offspring of the year, moving steadily, but cautiously through a wooded country, always depend upon the eye or ear for any danger in front, and, coming down the wind along nearly straight runways, are able to scent any foe approaching from the rear, be it man or wolf.

DEER EASILY SHOT AT THE RAILROAD CROSSING

My first information concerning this migration came shortly after reaching Lake Superior. On several occasions one of my hunting companions spoke of the annual visits each fall of his father and several friends to certain localities on the Northwestern Railroad between Negaunee and Escanaba, some thirty miles south of the town, where the deer crossed the tracks in large numbers on the coming of the first cold north winds.

The members of this party were more interested in fly fishing, but found it possible to shoot all the deer they wanted in a few days each fall, since they presented easy shots on crossing the track and could be transported all the way back by rail.

In 1874 I was asked to join this party, leaving when the wind turned to the north, about the middle of August, for in those days the hunting season opened on or before this date.

The camp was located behind a sand-dune at a station called Helena, where there was nothing to dignify its name except a switch and a section-house half a mile farther east. At this point the railroad cut through a number of hardwood ridges, with open and nearly dry swamps between them.

Some of the deer followed large runways in the timber, crossing the track where there were deep cuts, and others came at a trot through the swamps, where often they could be seen at a considerable distance. The hunting was almost equally good for forty miles, most of these deer passing between Little Lake and Maple Ridge, coming from that portion of Lake Superior between Marquette and the Pictured Rocks, points indicated on the map (page 114). A similar migration occurred west of Marquette and throughout northern Wisconsin.

SAVING A QUARRY FROM THE TRAIN

On the first hunt I was placed on the south side of the track at a deep cut, where a deer had to come down one bank and up the other; so I was advised to wait until it was crossing the track, when I would have a better chance.

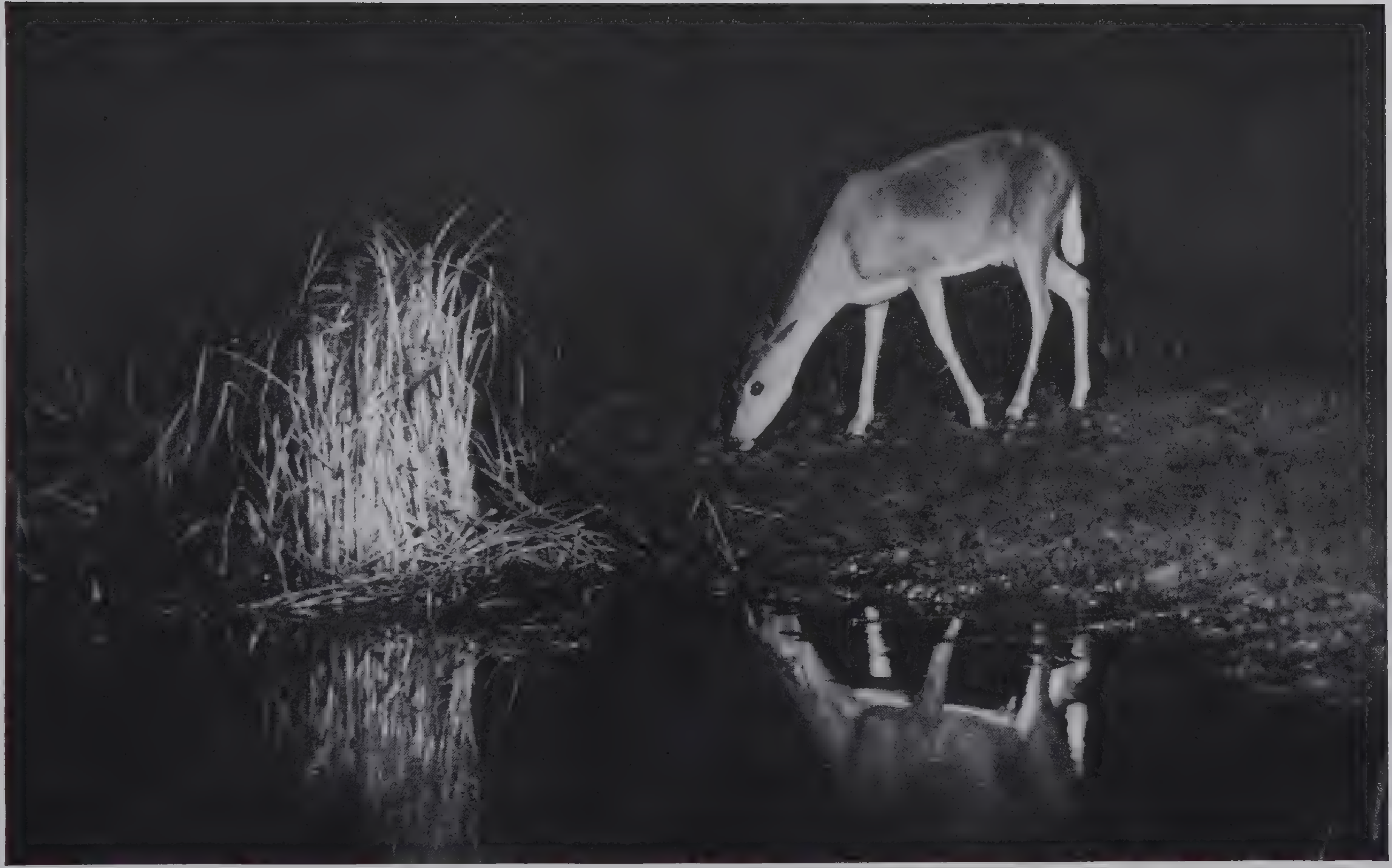
I had been concealed in the little brush blind about half an hour when, diagonally up the track, I saw a deer come out of the forest and stand on a bank cleared of brush. Remembering the instructions, I waited with considerable anxiety for it to advance. Just then could be heard the rumble of an approaching train bound west, with empty ore cars for the mines, and the deer, too, noticing the sound, evidently hesitated to advance.

After a minute's delay it seemed certain the animal would turn back, for the train was in sight, less than a quarter of a mile away. So, taking careful aim, I fired. The deer, giving a tremendous jump, toppled over the bank, lying with its head and shoulders across the track. Seeing it would take quick action to reach the animal before the train mutilated it, I hurried, arriving none too soon, for the heavy engine passed just as the deer was pulled aside, the engineer excitedly waving his cap by way of congratulation.

A SURPRISED HUNTER

On one of the fall camps at Helena the wind shifted to the south the afternoon of the second day, and any likelihood of deer crossing the track depended upon the return of the colder winds.

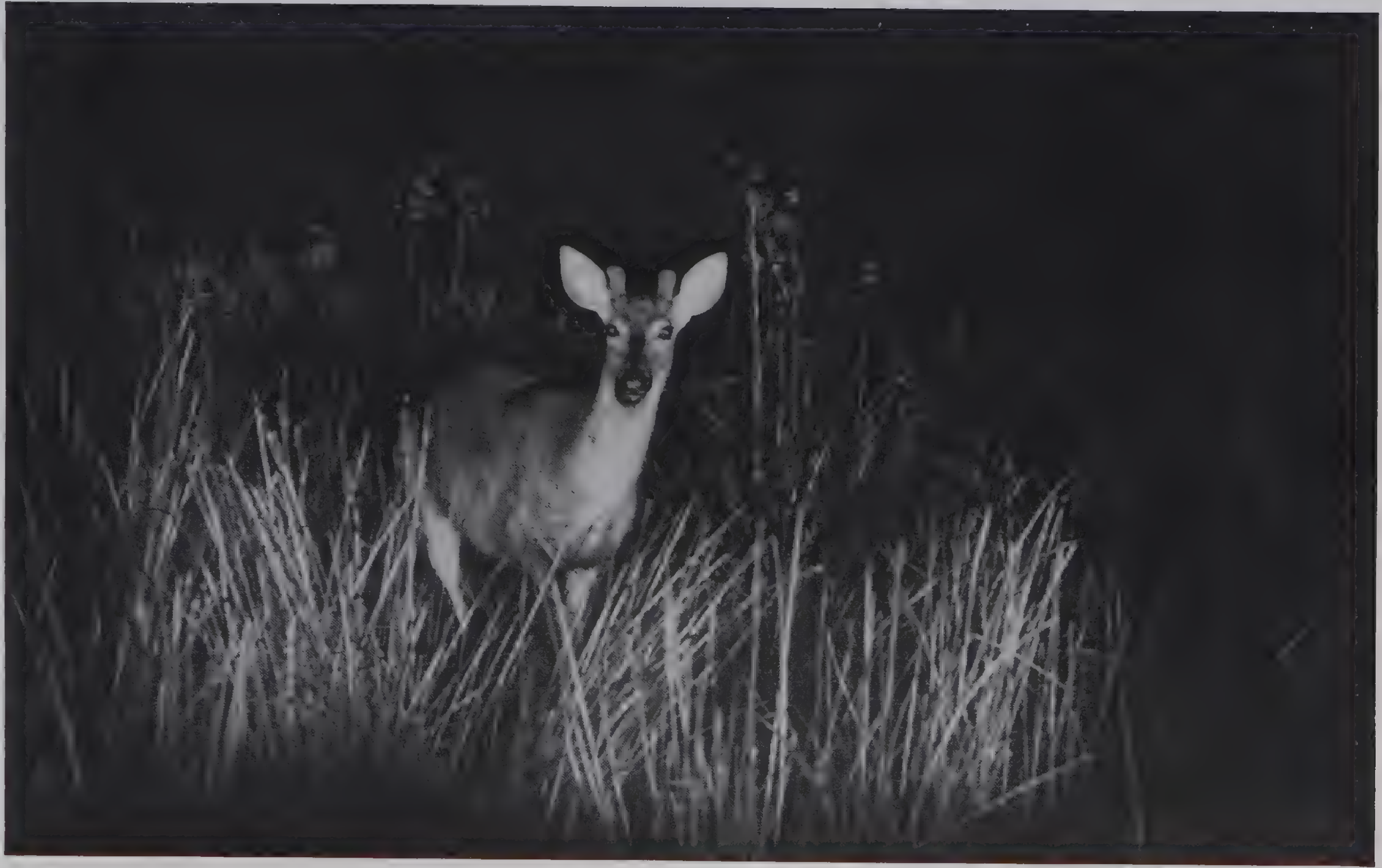
Toward evening we were visited by a miner of Irish extraction, who carried an ancient and rusty weapon of uncertain



Photograph by George Shiras, 3d

MIDNIGHT REFLECTION

A flashlight of a feeding doe, showing indifference to the jack-light after watching it for a few minutes.



Photograph by George Shiras, 3d

A BIG SURPRISE FOR A LITTLE BUCK

This young animal fed toward the canoe, with its body partly concealed by the marsh vegetation; on raising its head at the edge of the reeds it was surprised to see the jack-light less than twelve feet away, and still more astonished when the flashlight exploded just in time to preserve the scene.

Photograph by George Shiras, 3d

THE FIRST FLASH, FOLLOWED A SECOND LATER BY ANOTHER, SHOWN ON OPPOSITE PAGE

caliber. He asked if he could borrow a headlight we had in camp, having been told by his companions that the only chance of getting a deer depended upon the use of such a light at night.

For nearly two miles along the railroad were deep ditches on either side, resulting from the removal of the earth for the road-bed when laid through the swamp. Throughout the summer these ditches were filled with many water plants liked by the deer. Both the local deer and those traveling south often came to the ditches after dark, where they could easily be shot by any one walking up and down the track with a headlight.

Having shot several deer before the wind changed and not caring for this method of hunting, except as a last resort, the light was prepared and the ambitious night hunter was instructed as to its use and told just how the shining eyes of a deer would look when reflecting the rays of the lantern.

Shortly after dark he started down the track. In the course of half an hour came a particularly heavy report, vindicating the aspirant's remark "that the gun was loaded with a handful of powder and another of slugs," and he "rather guessed it would lay out anything that came in the way."

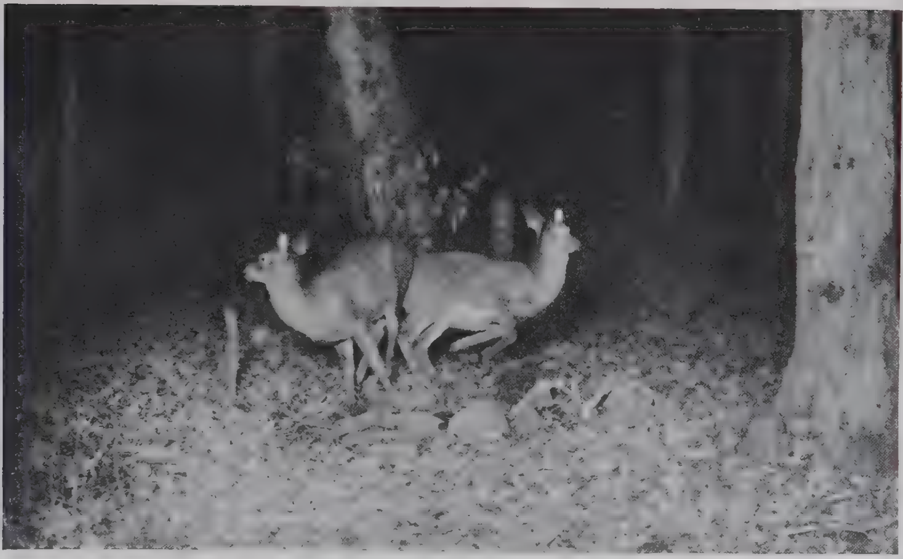
After waiting several hours, we went to bed, wondering just what had happened.

A PET SLAIN IN THE SECTION-HOUSE

At daybreak the fly of the tent was jerked open, disclosing the bulky form of the section boss, who lived half a mile down the track. Thereupon he grimly asked, "Were you boys out under the light last night?" A unanimous and spontaneous response in the negative seemed to reassure him, for he remarked it was a fortunate thing, since the time had come when a graveyard should be started for fool hunters in this neighborhood.

Pressed for an explanation, he said that after his men had gone to bed, there came an explosion, sounding as if "Mogul No. 9 had busted her boilers." Investigation showed the entire lower sash of a window of the section-house had been blown to pieces, while in the middle of the floor lay Black Tom, their cat, in a mutilated condition, the slugs continuing their course into logs between the upper and lower bunks containing several peaceful sleepers.

On opening the door and looking out, they saw a headlight and some fellow hastily reloading his gun. Thereupon each had seized an axe or a crowbar and



Photograph by George Shiras, 3d

A DOUBLY-INTERRUPTED MEAL

These twin fawns, on finding a pile of cabbage leaves behind camp, considered themselves in rare luck, but as the head of one was lowered the thread running from the stick on the left to the tree on the right released the flashlight; then the flame of the powder burned a string, releasing a leaden weight connected by a string with another flashlight and camera, thus showing a peaceful scene during the first flash (see opposite page), and the efforts of the fawns to bound away in different directions just as the second flash exploded.

started toward their assailant, "using language common to those parts; but, hampered by bare feet, they were unable to overtake him, and when last seen he was headed in this direction, going strong."

"CHASED BY WILD INDIANS"

Without further explanation, we knew that our unfortunate visitor had seen the glowing eyes of the cat, as it sat on the window-sill, and at such distance the section-house could not be seen; so, very naturally, he fired, thinking the eyes were those of a deer. But what had become of him and our light was now the question.

Toward noon a stranger appeared, and, depositing the lantern by the tent, prepared to depart with only a bare greeting. This, however, did not suit our idea of the situation; so he was asked what had become of the man who borrowed the light. Thereupon he said that Pat had crawled into the tent during the night with a tale about "being chased up the track by a band of wild Indians brandishing tomahawks and spears," and if he "had not been a sprinter they would have gotten his scalp." Furthermore, he said he intended taking the first ore train in the morning for the mines. Before leaving, however, he told how he had fired at a big pair of green eyes, following which came a crash and a chorus of war-whoops, and he added that this was all the deer hunting he needed for the remainder of his days.

THE END OF THE MIGRATION

As the number of hunters increased along the railroad each fall, scaffolds were built a little way to the north on some of the approaching runways, thus cutting off those lying in wait at the track and leading to many controversies.

On one occasion, when still hunting along a trail, I found the remains of an Indian deer fence running for half a mile to the southwest, showing that years before the Ojibways of the Lake Michigan shore had taken advantage of this migration.

It has always been well known that deer will not jump even a low obstruction

Photograph by George Shiras, 3d

CAUGHT ON THE JUMP

This animated scene was obtained by the deer firing a blank cartridge first, and as they bounded away a released weight discharged the flashlight. Note that the fawn has not yet acquired the quickness and agility of the adult deer.

if placed in the general direction they are traveling. Such a brush fence, when crossing a number of runways, leads all the migrating animals to a point where the Indian hunter could kill them readily, or when absent a pit covered with brush precipitated the animal to the bottom, in some instances impaled on sharp stakes.

In 1885, some twelve years after my first experience in hunting the migrating deer, I made what proved unexpectedly to be a last visit. On arriving at one of the favorite crossing places, a barbed-wire fence was found strung for miles, south of the track, and post-holes were ready on the opposite side. It was apparent at once that this double barrier would soon terminate the annual migration, and a winter home must thereafter be found along the inhospitable shores of Lake Superior.

Before putting up the tent, I took a position on a high bank, from which place I saw a deer crossing the track some distance above. I wondered which direction it would take when intercepted by the fence. In a short while the unfortunate animal came ambling along, looking for an opening to the south, when a bullet ended its career. Feeling that such hunting was unfair, I gathered my outfit together and left on the next train.

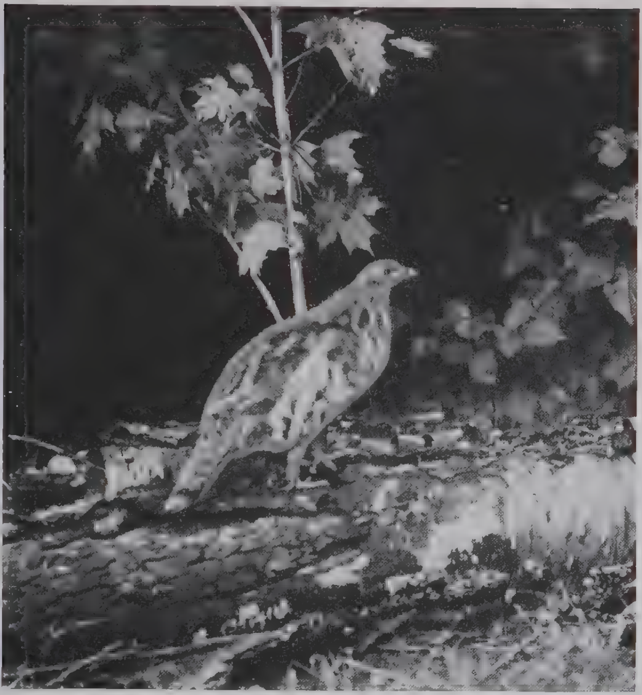
Thus ended the deer migration of many centuries. Today all the great runways are obliterated by bushes and fallen trees; but, contrary to expectation, the deer soon adjusted themselves to their permanent home on and near the south shores of the lake. While sometimes in great peril when the snows are deep or crusted, they have, on the whole, a safer place than their former winter retreats in the south, where a largely increased population would soon have taken a greater toll than the timber-wolf or the lawless hunter of the north.

FACTS AND FALLACIES ABOUT THE WHITE-TAIL

There has always been a tendency on the part of some, when describing the white-tail, to illustrate the text with heads bearing an extraordinary number of points, whereas this animal, like the elk, is the only other member of the deer family having a growth of antlers remarkably uniform in size, shape, and number of points.

Any with thirty to forty tines or half that number are simply freaks and no more typical of the white-tail than one with three legs or two tails. Several million bucks have been killed in the United States, Canada, and Mexico in the past seventy-five years, and most of those of unusual size or marked eccentricities in growth have been saved; so that it would be strange if in this large total there were not several dozen having an abnormal number of points or some unusual malformation.

The yearling buck is called a "spike horn"; the second year the antler has two points and is Y-shaped, and on the third, fourth, and sometimes the fifth there is an additional prong, representing with fair accuracy the earlier years. Thereafter there is no means of estimating the age except by the size and massiveness of the beam, which becomes uncertain when a deer passes beyond its prime, for then there is usually a recession in the size and weight of the antlers.



Photograph by George Shiras, 3d

A RUFFED GROUSE THAT TOOK ITS OWN PICTURE

At the edge of a clearing a bunch of mountain-ash berries was hung on a maple sapling, with a thread running to the camera shutter. A little later a female grouse pressed against the thread, with the resultant picture.

The maximum number of points vary from four to five, according to the range. In the south they are usually "four-pointers"; in the north and southwest the largest bucks average five points, which may be considered the standard in the respective localities.

PECULIAR GROWTH OF ANTLERS NOT DUE TO INJURY WHEN YOUNG

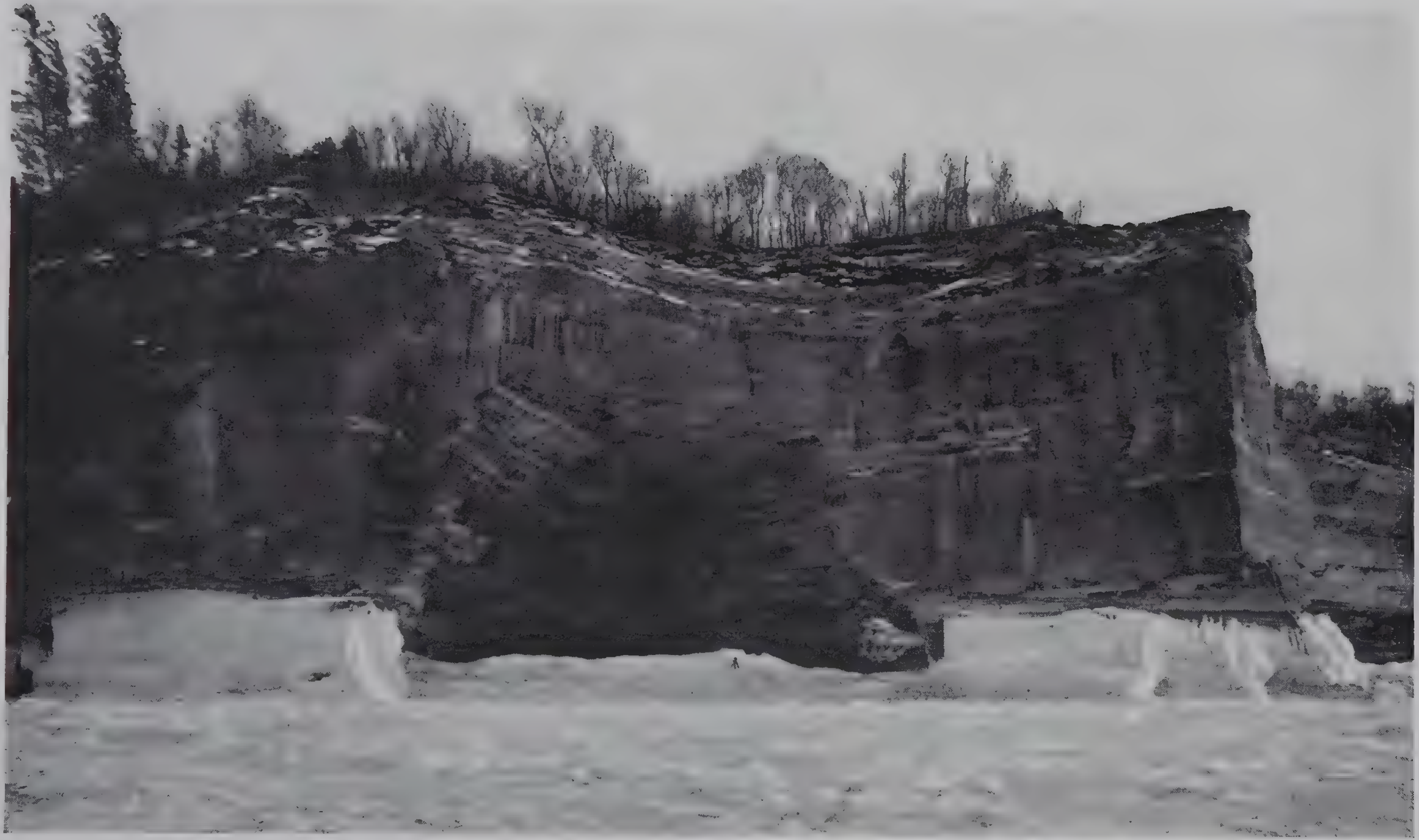
Sometime it has been suggested that a head having a great cluster of tines or other abnormalities has resulted from an external injury during early growth, but this, too, is erroneous, for with hardly an exception a peculiarity in one antler is duplicated in the other; and, moreover, these persist year after year in the same animal; consequently the internal growth is of symmetrical formation and in nowise affected by external causes.

Another fallacy—in fact, a double one—is the belief of many that the variance often noticed in the color of the antlers is due to a stain when the velvet is supposedly rubbed off on saplings, those of resinous character staining one color and those with a different sap another color. Any such uniformity in results is impossible, and would only cause a temporary and limited discoloration.

But, what is more to the point, no member of the deer family removes the skin-covering, or so-called velvet, at the time or in the manner suggested, though occasionally a buck will use its forefeet for this purpose, or gently switch its antlers in the brush.

"HORNING" OF TREES A SEXUAL MANIFESTATION

The "horning" of a young tree evidences the beginning of the rutting season, being purely a sexual manifestation.



NORTH END OF GRAND ISLAND, THE WESTERLY TERMINUS OF THE PICTURED ROCKS

It was over this precipice the imported Newfoundland caribou were supposed to have met their fate when chased by a timber wolf (see page 181). Note the human figures at the base of the cliff.

These trees are rubbed fully a month after the velvet has been shed, and some weeks before the does are responsive, or about October 15, in the Lake Superior district.

In the past ten years I have been in the Michigan forest during all that month, my notes showing that the first rubbed sapling was October 5, and in the nine other years the date averaged the middle of that month.

In rubbing the antlers on a sapling, the white-tail lowers the head until the nose comes within a couple of inches of the ground, and then, in a deliberate way, one beam is pressed against the tree, the friction removing the outer strip of bark for about sixteen inches, showing the fresh white streak of the inner wood. The tree, small as it is, is seldom girdled, indicating that the animal stands in one position.

CARIBOU AND ELK ATTACK TREES AS IMAGINARY RIVALS

The caribou and elk, however, often regard the tree as an imaginary rival, attacking it with considerable vigor. Once I saw a bull elk butt a lower branch of a heavy red cedar, and as the limb rebounded the animal received a stinging blow in the face; whereupon he charged with the full weight of the body, snapping off the limb with a report heard 200 yards away.

The does bear their fawns on the higher ground, between May 25 and June 25, or seven months after the rut, concealing their young in balsam or maple thickets, where the family group lingers until fall, being more open to attack by the illegal hunter than the bucks, who hide in the thick and almost impenetrable swamps.

On the coming of the heavier frosts, in early October, the bucks wander about in the night, rubbing the trees and pawing up the ground some weeks in advance of the mating season, which occurs between October 20 and November 20, shortly after which the antlers are discarded, usually between December 1 and January 15.

Contrary to general belief, the antlers are not for use in defense against predatory animals, like the wolf, for they are shed before the coming of the deep snows and when open waters still offer an effective means of baffling pursuers. When chased thereafter a buck will make his final stand by facing the foe, rearing high and coming down with the sharp forefeet on any animal attacking from the front.

ANTLERS USED IN MOCK BATTLES

The antlers are, therefore, purely a sexual manifestation, being used freely in mock battles with a rival. These sometimes develop into a serious affray, and then death may come when the antlers are inextricably interlocked.

The larger bucks weigh between 200 and 300 pounds, and it has long appeared to me that those of upper Michigan, either by gradual evolution or survivorship, possess much longer limbs than any of the species elsewhere. Living permanently in a region of deeper snows, it would seem that the ones having the longest legs would get a better footing or be able more easily to leap over logs or windfalls when being driven by the timber-wolf.

On the other hand, the deer of the lower Alleghany Mountains in the State of West Virginia seem to have unusually short legs, for in this region their only safe retreat from hounds or man are the dense laurel thickets, where many of the runways pass under gnarled limbs only a foot or two above the ground, so that the ones more likely to escape pursuit are those capable of entering the first thicket or passing from one to another.

HOW THE MICHIGAN LICENSE SYSTEM NEARLY EXTERMINATED THE DEER

As a step toward conserving the deer, the number that could be killed annually in 1895 was restricted in Michigan to five for each hunter, and the license bore five detachable coupons for use in tagging each carcass. In the opinion of all sportsmen, this new system was expected to be of the greatest future value.

Then occurred an extraordinary psychological influence, upsetting all calculations, and Marquette County well illustrated what happened throughout the Upper Peninsula. Heretofore about three hundred persons hunted deer annually in this county. When the first licenses were issued, the usual number that had hunted previously applied for permits, but it was noticed these applications kept on increasing throughout the season, until they totaled 652, far exceeding any previous year.

From this it appeared the public got the idea the State had awarded each of its citizens five deer a year at a nominal cost for those thrifty enough to act.

NUMBER OF HUNTERS INCREASED BY LICENSE SYSTEM

The following season other influences directly traceable to the license system not only increased the number of hunters, but, to a disproportionate extent, the number of deer killed; for it was observed that persons who theretofore were content with a single deer, or when disappointed on a hunt gave up at once in disgust, now tried to kill their legal limit, going to the woods again and again in this endeavor, and were not above having others supply the missing number if unsuccessful.

This situation was further influenced by the newspapers containing many personal items to the effect that "John Doe has filled his license during the first week," or that "Richard Roe expects to do so on the next hunt," and other suggestive statements, making each licensee feel he was on trial as a sportsman and a possible subject of ridicule when returning empty handed. Moreover, the licenses, with their strips of coupons, were conspicuously displayed in factories, shops, and offices or on the street corners, until hundreds who never had the slightest idea of hunting deer joined the crowds on their way to the county clerk's office.

An examination of the following figures ought to prove of interest, especially in view of the fact that there was no increase of population in this county, but actually a small decline during the period indicated.

MARQUETTE COUNTY DEER LICENSES

Year.	Licenses issued.
1894....(estimated)	300
1895..............	640
1896..............	813
1897..............	853
1898..............	950
1899..............	1,047
1900..............	1,306
1901..............	1,532
1902..............	1,749
1903..............	1,942
1904..............	2,060
1919..............	3,379

This extraordinary increase from about 300 before licenses were issued to more than 3,300 hunters in a single county seems to have no other explanation than the one given. The system has brought about the destruction in the State of more than two hundred thousand deer that would otherwise have escaped and has continued indefinitely a well-organized band of hunters.

However, the license system in vogue throughout the most of the country has been of greatest value, supplying each State with ample funds for preserving the game and in many other respects proving of inestimable service. It just so happened to have had the opposite effect with Michigan's one big-game animal.

TEN DOES WILL HAVE 1,510 DESCENDANTS IN TEN YEARS

The white-tail is the one big-game animal whose perpetuation means more to the sportsmen of the entire country than any other animal.

The first and foremost necessity is a buck law to protect the females and fawns in every State containing any antlered animal.* Just let it be understood that when a buck is shot the number for the following year is lessened by only one, whereas he who kills a young doe destroys, by a single shot, potentially 151 bucks and 151 does! For it has been shown, upon a strictly scientific basis and by an accurate mathematical calculation, that a doe and her descendants in a period of ten years, not counting out the natural casualties, will produce a total of 302 deer, and by the death of this ancestral mother the link is broken, with the irrevocable loss stated.

The same proportion holds true with a larger number, for ten does and their descendants will produce 1,510 bucks and 1,510 does, showing that when the female is protected more deer can be killed each year, beside leaving an increased number in the woods.

Such a result is not, after all, so mys-

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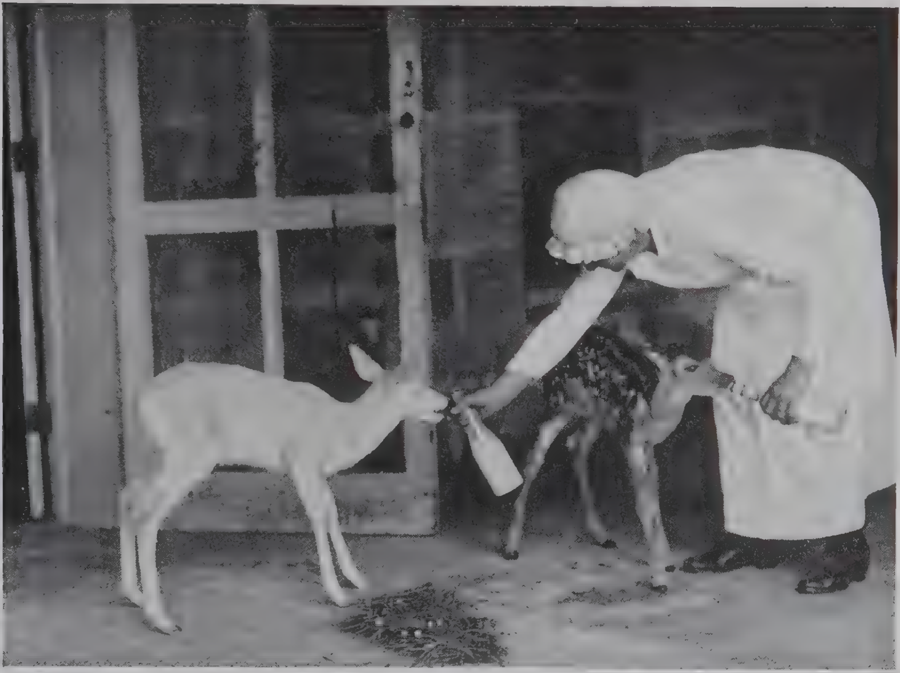
* Twenty States have passed this law.



Photograph by George Shiras, 3d

WHITE FAWN FOUND IN 1916, WHEN A DAY OR TWO OLD

Reared in company with the red fawn. The usual row of white spots can be seen on the white body (see page 183).

terious, if we keep in mind the methods of reproduction applicable to domestic animals; for if a farmer had as many bulls as cows, as many roosters as hens, and killed them indiscriminately of sex, he would, of course, be classed as demented.

Just because our wild animals bear their young in remote thickets, we seem to think their maintenance is based upon a different method, and go on killing the females year in and out under the blind assumption that it can make no particular difference in the future supply, whereas it represents the difference between extinction and perpetuation.

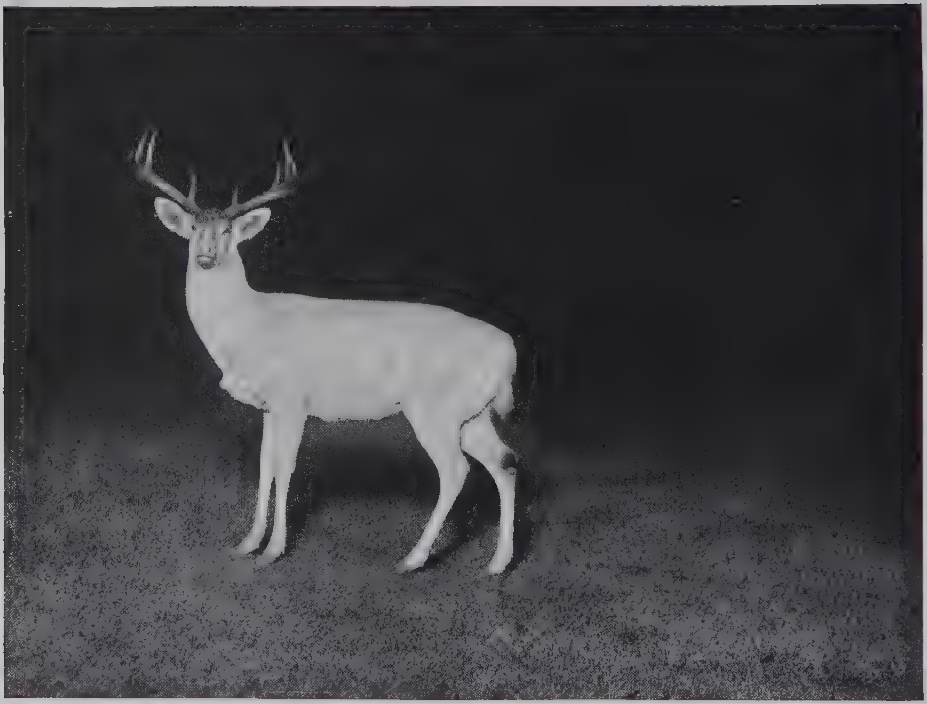
In my boyhood days it is doubtful if there were a thousand deer in the wilder portions of Pennsylvania. Last year 3,000 bucks were killed in that State, and this number will increase steadily, the only limitation being a sufficient area to sustain such a multiplication of the species. But in this State, like New York and Vermont, the second growth in rough and mountainous portions has been restocked with game and properly safeguarded, showing how the older localities have already taken advantage of the favorable change in environment (see page 204).

CHAPTER IV

THE SUDDEN DISAPPEARANCE OF THE PASSENGER PIGEON IS THE GREATEST OF ALL BIRD MYSTERIES

The final stand of the passenger pigeon was made in northern Michigan, Wisconsin, and western Ontario, and in this general locality I witnessed the demise of a once countless species. Gradually the flocks had been driven from their haunts in the Atlantic coast states and about the Ohio Valley, but from the time I first went to Lake Superior to the date of their sudden disappearance, the wild pigeon seemed to be present each season in its usual abundance.

For a species that far exceeded any other game bird, a gradual decrease



Photograph by George Shiras, 3d

THE ANCESTOR OF THE ALBINO DEER HERD OF GRAND ISLAND

Observed first in 1912; killed by a pot-hunter in 1914, when about seven years of age. Body mounted as above. Spread of antlers, 2 feet 2 inches; weight, 150 pounds. It has had nine white descendants so far (see page 182).

might be attributed to several reasons apart from the various and continuous methods of destruction, namely: the range was always east of the Great Plains, thereby permitting concentrated hunting in the more accessible regions. Furthermore, each pair had but one young, in contrast to the domestic pigeon, with double the number. However, their unexpected and inexplicable extinction in, perhaps, a single season constitutes the greatest of all ornithological mysteries.

The birds came in vast flocks to Lake Superior in May, and before colonizing for nesting they were killed by natives, who fired into the passing flocks as they swept low along the shores, this being the only period when wing-shooting was indulged in.

After the birds had selected a breeeding place, usually in the same locality each year, the slaughter began; for, besides the local hunters, the professional trappers were quickly notified of any gathering place, and were soon on hand netting or killing these birds by the thousands for the eastern market, besides shipping them alive in crates for trap-shooting tournaments.

BIRDS SLAUGHTERED BY FIRELIGHT

I never attended any of the holocausts at the breeding places, for such they often were, since circular fires were built around the roosts after all the birds had assembled for the night, and in the confusion of the smoke and flames they were beaten down and destroyed in the most relentless manner.

About the middle of July the survivors, with their young, dispersed over much of the surrounding country, gathering particularly about huckleberry plains and burnt - over districts, where ground food—huckleberries, alder-berries, wild cherries, and service-berries—were abundant.

After the wild fruits were gone many

Photograph by George Shiras, 3d

FIRST ALBINO FAWN, AT THE AGE OF THREE YEARS, IN ITS SUMMER COAT, WHEN THE PINK SKIN SHOWS PLAINLY THROUGH THE THIN, WHITE HAIR (SEE P. 185)

flocks moved into Canada, where a later berry season was the attraction, and by October all departed for the south, unless a heavy crop of beechnuts led some to linger.

It was in August, 1885, that I made the usual trip to some large plains covered with huckleberries, ten miles up the shore from Marquette and inland about a mile, where it was my custom to kill, once a year, a large number of pigeons for distribution among friends. Such an expedition differs from the ones where shooting was limited to a few for camp use.

Selecting the young, so readily told by the immature plumage, it took only a few hours to accomplish my quest. At this time the birds were in their usual numbers, and I returned under the belief the wild pigeon would continue for many years in this region.

BIRDS SUDDENLY VANISH

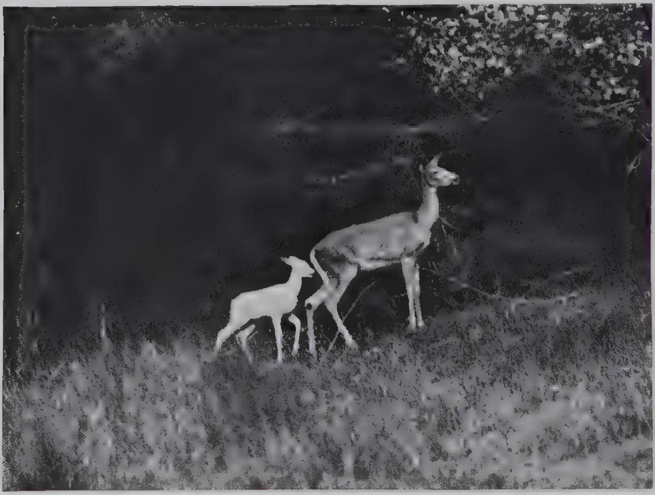
The next season I saw a single bird; but, like the rest of the hunters, concluded that for some unforeseen reason the pigeons had gone elsewhere and would surely return the following year. But not one, to my knowledge, has been seen since along the Lake Superior shores.

When the unfortunate history of this bird is examined, it is not hard to see that it was doomed because it was a migrant. The rule in each State was to have an open season when such migrants were present and a closed season, if any, after they had gone. This meant, of course, continuous shooting throughout the year.

In 1857 the Ohio legislature enacted a law protecting local game birds, and the committee report gave as a reason for not including the wild pigeon the following:

> The passenger pigeon needs no protection. Wonderfully prolific, having the vast forests of the north as its breeding grounds, traveling hundreds of miles in search of food, it is here today and elsewhere tomorrow, and no ordinary destruction can lessen them or be missed from the myriads that are yearly produced.

The fact that migrant game birds, above all others, needed protection was not seen at that time, and not until long afterward, when the passage of the Federal migratory bird law made possible an



Photograph by George Shiras, 3d

SECOND WHITE FAWN AND THE NORMALLY COLORED MOTHER

Both are wild and unapproachable (see page 183).

adjustment of the open seasons throughout the country consistent with the protection of this class of birds.*

An epidemic or some convulsion of the elements, such as an offshore gale, with the clouds raining down heavy hailstones, may have accounted for their sudden disappearance, but from information available one can only guess as to the immediate cause which brought about their untimely end.

RUFFED GROUSE MOST HIGHLY ESTEEMED OF UPLAND BIRDS

The most highly esteemed game bird of the northern uplands, whether for sport or the table, is the ruffed grouse. Clothed in rich gradations of brown or gray, the neck encircled by a ruff of iridescent black, erect in figure, with a sweeping fan-like tail, its presence is often disclosed by a sudden whirr and a meteoric flight, startling even to the expectant hunter or the trailing fox.

With the extinction of the passenger pigeon, once so numerous about Lake Superior, and the rarity with which shore birds or wild fowl venture across broad waters with unsighted shores, the perpetuation of the ruffed grouse as the sole resident game bird of the region becomes unusually important.

On my first camping trips the grouse were found in many clearings, second-growth thickets, and about old lumber roads; for berries, insects, seeds, and sunlight induced such gatherings. For years I was under the impression that this bird was well distributed and numerous. Later I found that in the main forests and in localities where water was distant more than a quarter of a mile scarcely a grouse could be seen, except when midwinter drove them into the heavier timber.

After the local hunters increased tenfold and the automobile gave access to the more remote places, the grouse of upper Michigan declined to a point where extinction was imminent and appeared certain when two cold, wet springs occurred and hardly a young bird survived.

A REMARKABLE INCREASE IN BIRDS

In 1917 the legislature closed the season for two years, and the result exceeded all expectations. The ensuing year showed a great many scattered coveys, and the next they more than doubled, while in the spring and summer preceding the open season the birds were found in numbers never known before in the history of the country, automobiles being stopped frequently by birds dusting themselves in the woodland roads.

With a daily limit of five birds and a total of 25 for the season, one might have supposed that the number killed would hardly have equaled the best years of the earlier days. But they were brought in the first day by the hundreds, by thousands the next week, and then by tens of thousands, exceeding a total of one hundred thousand in the shortest season.

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* Mr. Shiras has refrained from stating that in 1904, when a member of Congress, he was the author of the original migratory bird bill, the later enactment of which has insured not only the perpetuation of our wild fowl and insectivorous birds, but has already led to a greatly increased number. This measure is generally regarded as the most important game legislation that has been passed by State or nation.—EDITOR.

Photograph by George Shiras, 3d

SAME WHITE FAWN AND COMPANION IN FALL, WHEN EACH HAS LOST THE WHITE SPOTS (SEE PAGE 183)

In Minnesota in 1920, under a similar closed season, but with larger bag limits, the kill was unparalleled, with a total exceeding 500,000 grouse.

THE GROUSE THRIVED IN CLEARINGS

Many might naturally think that this wonderful increase was wholly due to the previous closed seasons. While undoubtedly making such a showing possible, in the writer's opinion the result was primarily due to another distinct and, fortunately, permanent cause, namely, a gradual and favorable change in environment during some thirty years preceding.

By reason of overshooting and unfavorable weather, the grouse of Michigan, Wisconsin, Minnesota, and western Ontario had been greatly reduced, only a scattered bird being found here and there. With a two years' closed season the remnant had an opportunity to establish itself in the thousands of clearings where few birds had ever had a chance before. The fact that one pair and their offspring would produce some 200 birds during the period they were thus protected indicates how the grouse was able to spread quickly through the entire region.

BIRDS NOW SHOT ON THE WING

The daily limit of five birds has resulted in a new form of sport in northern Michigan. Accustomed in this region to killing the grouse on the ground or in the trees, the hunters soon found the limit of five birds might be reached shortly after discovering a well-filled covey, and the day's sport ended in a moment. Therefore, for the first time, many began shooting on the wing, using thousands of shells without much damage to the fleeing birds, but greatly expanding the day's sport.

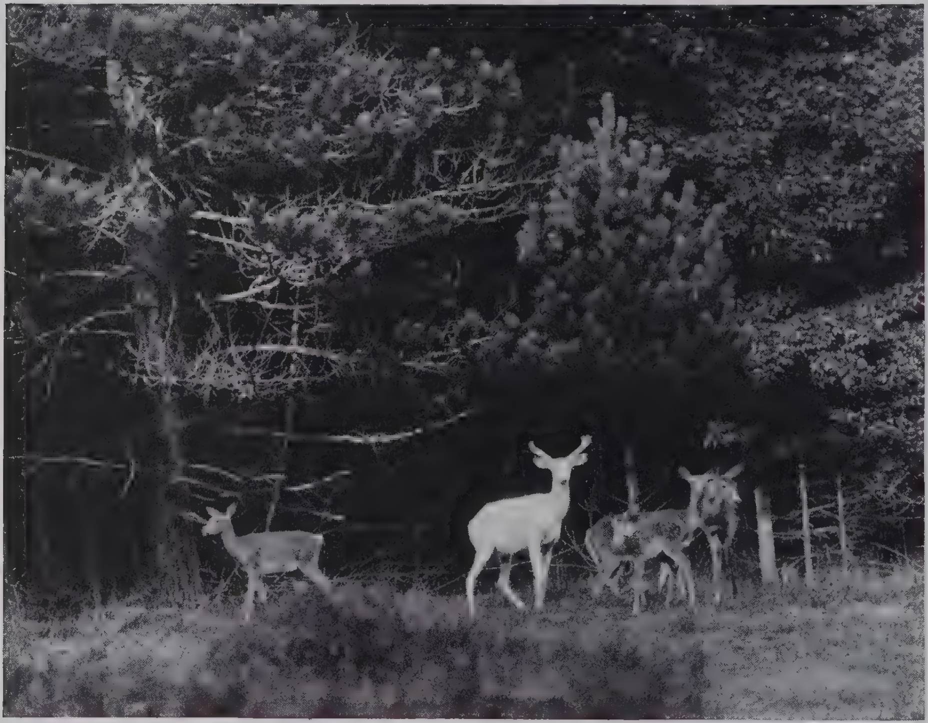
"A dead bird tells no tales," but the many survivors of this aërial bombardment have received a greater education regarding the use of gun than any of their predecessors, many finally acquiring the alertness and caution of the grouse of the Eastern coverts.

PECULIAR HABITS OF THE GROUSE

In the temperate months the grouse has an excellent choice of food, consisting of a great variety of berries, small fruit, seeds, buds, clover, beechnuts, grasshoppers, and a multitude of young, tender leaves. In the winter one wonders at their survival; for now the fall flight of the robins completely exhausts the berries, which were wont to linger and ripen well into winter, compelling the grouse to depend largely upon yellow birch buds, with many a forced meal on an evergreen.

Fortunately, whenever the temperature is far below zero the sky is usually clear and the grouse are active and unconcerned, but if the days and nights are dark and cold or the air filled with merciless pellets, they have the habit of plunging from a higher branch head foremost into deep snowdrifts, where a foot below the surface the heat and weight of the body form a globular retreat, in which they remain comfortably until the storm clears or hunger forces an exit.

Once when seated in a tree watching for deer, several days after the conclusion



Photograph by George Shiras, 3d

SECOND ALBINO BUCK, CAPTURED IN 1915, WHEN THREE YEARS OLD; WEIGHT, 160 POUNDS

Shown above with three normal deer and fawn. Antlers each year in the form of long spikes, with one forked. Note white velvet on the growing antlers (see page 185).

of a heavy snowstorm, I saw what looked like a small mouse at the base of a maple tree, and then this dark object elongated into the head and neck of a grouse. Finding the weather to its taste, it emerged, clucking and spreading its tail before taking flight for a repast upon the swollen buds of a near-by birch.

Many years later, while hunting the varying hare, just as a blizzard came sweeping in from Lake Superior, I saw the swift descent of a dark body from a tree ahead and a slight disturbance in the snow. Noticing a grouse in the same tree, I knew its companion had sought warmth and protection in the coverlet below and I withdrew without disturbing either.

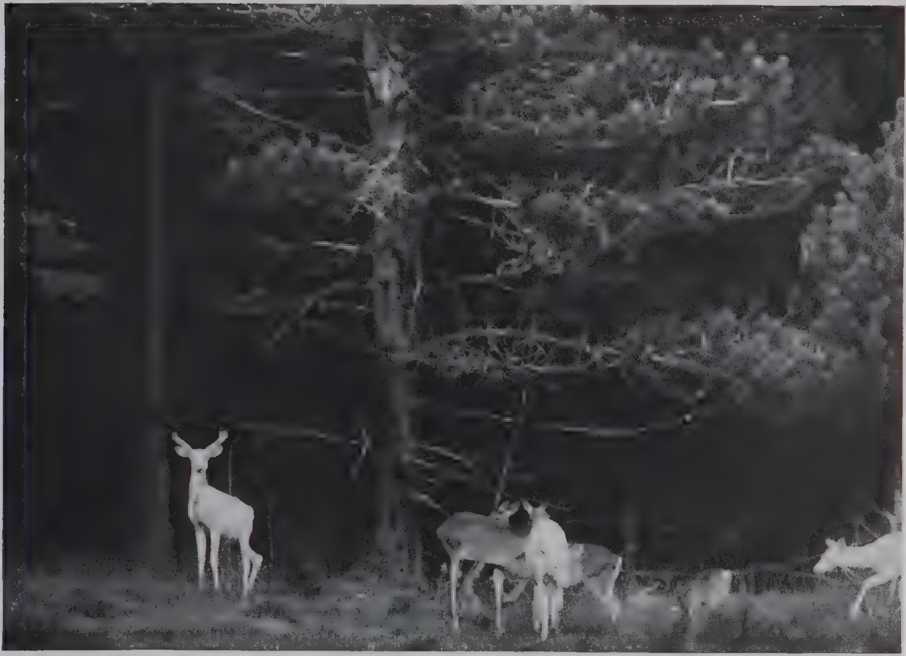
Sometimes in winter or the early spring there may come a rain or a warm day that melts the surface snow, followed by severe weather, and then thousands of grouse are imprisoned and the heretofore safe retreat becomes their tomb, should weeks pass by before the seal is broken.

CHAPTER V

EXTRAORDINARY CATCH OF LAKE TROUT WITH TROLLING LINES

In 1872, when 12 years old, I had an early introduction to lake trout. A report was brought to Marquette by a lumber-laden schooner, becalmed for a while in the vicinity of Stannards Rock, a sandstone reef lying a few feet below the surface, some forty-five miles northwest of the town, that the waters about the reef were surrounded by immense schools of lake trout. It was said that the fish could be hauled aboard the schooner by simply casting a trolling spoon overboard, when there was such a rush by the fish that one could imagine it was a contest to see which one might be caught first.

An enterprising captain of a local ex-



Photograph by George Shiras, 3d

WHITE BUCK WITH A MIXED HAREM OF WHITE AND RED DOES

This buck never recovered from the shock of its capture, remaining wild and lame (see page 182).

cursion steamer thereupon advertised an expedition to this vicinity, and about seventy-five persons, including women and children, departed under bright skies and unruffled waters. At noon the dangerous reef was approached cautiously, and the steamer anchored in about thirty feet of water.

Soon ten boats were lowered over the side, each expectant fisherman having a trolling line, as many as four or five lines trailing behind each boat. In a few minutes there was a rush of eager fish, and to my youthful mind there never were such scenes of excitement, for as the boats circled about the reef the long lines were diverted at various angles by the larger fish, becoming entangled, while the continued flopping of those captured caused the women and children to shriek in triumph or dismay.

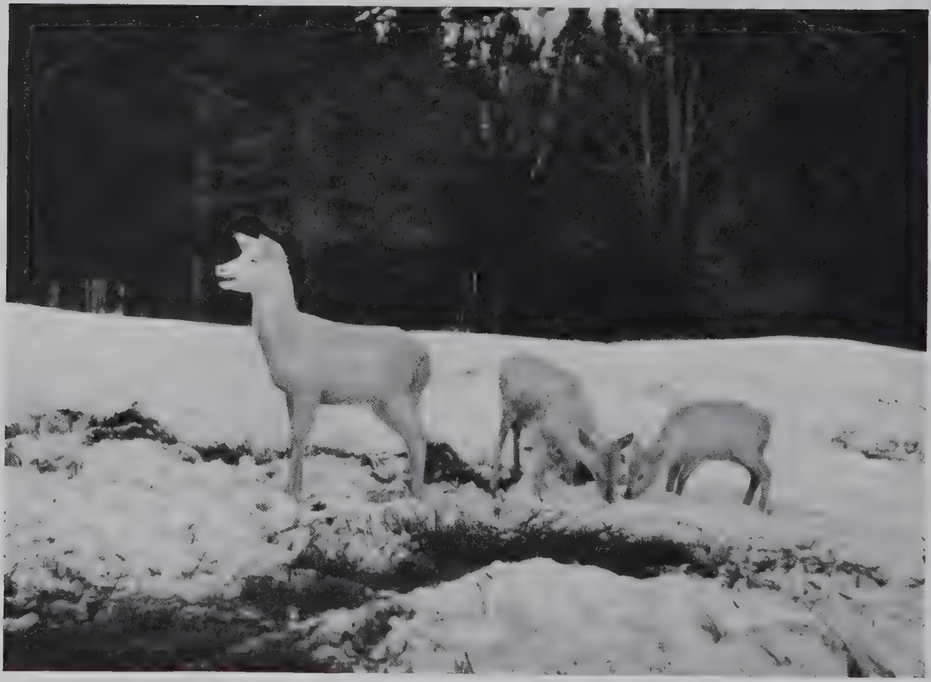
Several times I had on a fish weighing over twenty-five pounds, which only with the aid of stronger arms could be lifted free of the water. In one instance a spoon that became detached was cast overboard and a near-by fish bolted it and went off in triumph! In several cases tin-tipped oar-blades were seized, so anxious were the fish to try anything having a resemblance to living prey.

In less than three hours a thousand fish were taken, averaging ten pounds, and then this riot of destruction came to an end, for it finally became apparent how difficult it would be to give away five tons of trout among the friends and neighbors of the participants.

The results of this expedition soon reached the ears of the local fishermen, and for several succeeding seasons immense catches were made. Now a towering lighthouse surmounts this rock as a warning to the mariner and a fitting monument to the myriad of fish that have long since passed away.

AN IMPROVISED COOKING OUTFIT

On one of my earliest camping trips for speckled trout, with old Jack as guide, we rowed about three miles when it was discovered that the box containing the



Photograph by George Shiras, 3d

A PIG-LIKE ALBINO BUCK AND TWO WHITE FAWNS: GRAND ISLAND (SEE PAGE 182)

cooking outfit had been left behind. Naturally, I suggested returning for it; but Jack promptly said it would bring bad luck to do this after once having made the start, and, besides, with our pocket-knives it was easy to make what was needed.

In about three hours Shot Point was reached, the first rocks to the east, where I began fishing, leaving Jack to put up the tent and start the fire.

MAKING A FRYING PAN FROM A CAN

On returning with a creel of trout, I found Jack had already replaced the missing outfit. From large sheets of birch bark he had fashioned plates, while cups and other containers were made of the same material, with knives from hardwood and forks of double-jointed twigs. In the fire was a can of tomatoes perforated in the top to let out the steam, while well beneath the glowing coals half a dozen potatoes were baking. Alongside he placed the dressed trout, wrapped in wet, brown paper. Then the tomato can was emptied into a birch-bark dish before the fire, and with a piece of wire a bail was made for it, and soon the tea was boiling.

At the next meal, after heating a can of beans and removing the contents, it was cut and flattened into a frying-pan, with a handle made of a split stick, serving thereafter for frying trout or bacon and the all-important flapjacks.

On suggesting to Jack that several of these fireside conveniences depended upon having canned goods, he thereupon picked up a small boulder and explained that, after heating several of these in the coals, by putting them into the birch-bark bowl one could brew tea, make soup, boil fish, or have a stew.

This was my first lesson in the ease with which supposed essentials might be left behind, proving a useful experience when forced to travel light, or a capsize of the canoe sent the outfit to the bottom.

THE SPECKLED TROUT OF LAKE SUPERIOR

Prior to 1890 the range of the speckled trout included all of the shore waters for more than a thousand miles, except in places where sand beaches lacked coarse gravel or boulders, or continuous cliffs made the steady surge of the receding waves an unsuitable location for a fish particularly disliking turbid or unsheltered waters.

Every tributary stream contained trout as the permanent and almost sole occupants, with the temporary addition of all in the lake during the spawning season, unless flowing from headwater lakes, in which case the higher temperature and the existence of pickerel or bass discouraged their presence.

Consequently, good fishing was within easy reach of every settlement and camping place, the trout occupying a narrow strip within 50 feet of the shore or nearby islets and reefs, for beyond were the giant lake trout, which, while respecting absolutely the riparian rights of their more aristocratic kin, allowed no trespass in their own domain.

On the other hand, just to the east, Lake Huron, including Georgian Bay and the southern portion of Ontario, contained no speckled trout except in an isolated case or two, for bass, pickerel, pike, and land-locked salmon abounded, the less abrupt watersheds favoring chains of lakes with sluggish, interconnecting streams of a high temperature in summer.

A TROUT FISHER OF 70 YEARS AGO

In 1849 the paternal grandfather of the writer first came to Lake Superior, intent solely on trout fishing, having heard from pioneer business friends of the beauty and healthfulness of the region and the wonderful trout fishing. At the time of his earlier visits it was necessary to transfer around the Sault rapids, taking a small steamer that had been assembled beyond, when visiting any of the few settlements on Lake Superior.

To one who had fished only the brook trout of the Alleghany Mountains, the size, brilliancy, and activity of those in the lake were in striking contrast, and in the long period following he seldom visited any stream, for the smaller fish and their ease of capture did not appeal to him.

Accustomed to making his own bamboo rods, flies, dip-nets, or seines for catching minnows, he either fished from a little rowboat, anchored in a suitable location, or from some of the many points separating bays, where there was a steady movement of the larger trout.

Photograph by George Shiras, 3d

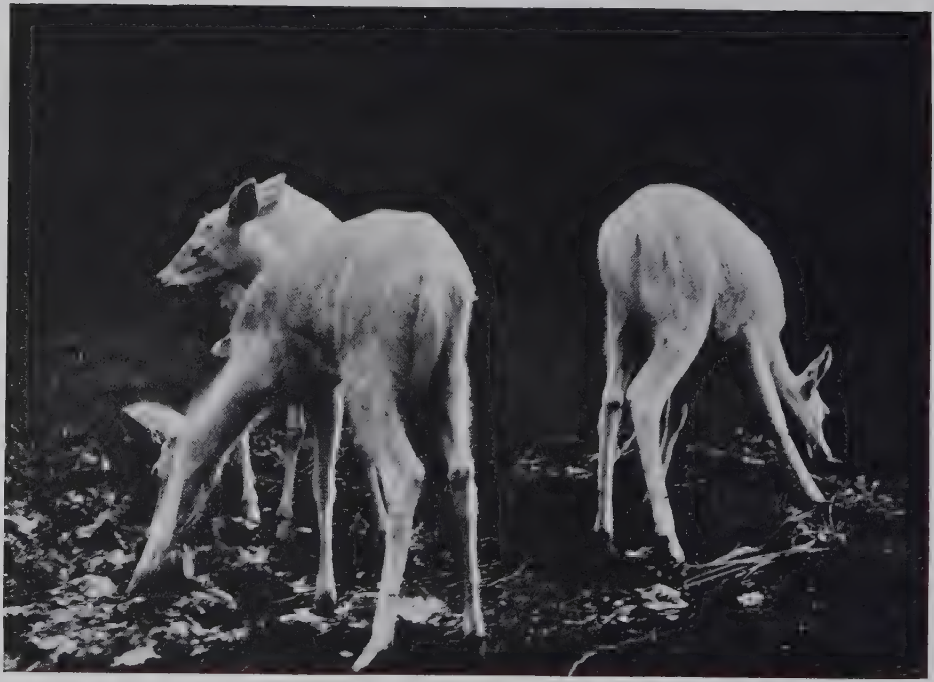
ALBINO DOE IN HEAVY WINTER COAT

She was brought from southern Michigan in 1918; eyes pink and very susceptible to light; hoofs and nostrils white (see page 183).

It seems worthy of mention that family records covering 65 years, and supplemented by other contemporaneous data, showed that the maximum weight of any trout taken was 5½ pounds, the average of the larger ones ranging from 4 to 4½ pounds (see page 131).

On the northern, or Canadian, shore the larger fish averaged about a pound less in weight, except in the Nipigon River, where specimens reaching ten pounds were not unusual.

Now that the trout along the southern shore are approaching extinction, a tragedy assured by the improvident custom of catching the remnant at the mouths of spawning streams, it is rather surprising to learn that occasionally a fish is taken weighing 6½ pounds, the explanation be-



Photograph by George Shiras, 3d

THE THREE ADULT ALBINO DOES UPON WHICH THE PERPETUATION OF THE HERD LARGELY DEPENDS (SEE PAGE 185)

The eyes of two are light gray, and the other red, in striking contrast to the black eyes of the normal deer.

ing the greater proportion of food for the few survivors.

INTRODUCTION OF THE ANGLEWORM ON LAKE SUPERIOR

The hooks used by this ancestral fisherman were long, slender, and slightly curved, allowing the tying on of different feathers well up on the shank, and including almost invariably a strip of red flannel or a piece of similarly colored yarn, beneath which was room for one or two large angleworms. In those days the use of live bait, and especially angleworms, was regarded as sportsmanlike, and apparently justified in the case mentioned, for the fish sought were those lying deep below the surface, on a rocky bottom. To hook these big fellows was only an incident in the long, hard contest with a slender rod.

Every spring, and while the angleworms were still near the surface, small boys were engaged to dig an ample supply in the vicinity of Pittsburgh, and these were taken in a two-gallon can to Lake Superior, where they were placed in a large wooden box filled with black earth and protected against a too-miscellaneous use by lock and key, for the angleworm was not to be found anywhere along the entire lake or adjoining territory. Toward the close of each season the remainder, if any, was distributed among eager applicants, and finally found an end within the gullet of equally eager trout.

"A SERPENT OF DISSENSION"

How this apparently harmless earthworm became a miniature serpent of dissension happened once when the surplus was turned over to an elder of a village church, with directions to apportion the supply equally among his associates. Some time later word came that a great row had developed over their distribution, followed by a secession of a part of the congregation and the building of another edifice.

Photograph by George Shiras, 3d

AUTHOR'S CAMP, ST. IGNACE ISLAND, NORTH SHORE, ONTARIO

Here the tents faced 160 miles of open water, where many medium-sized trout were taken within a hundred yards, but most of the larger ones became the victims of a gill net extending to the shore, ostensibly set for lake trout of the deeper waters (see page 187).

This ancient fisherman was never able to determine satisfactorily whether he was to blame for such a breach or was to be congratulated on having brought about the establishment of two churches where there had only been one before.

In 1878, on receiving a larger remnant of angleworms than usual, I planted them in the neighborhood, with the hope that in a short while the local supply would meet future demands. At the end of three years they became very abundant in this little preserve; so some were taken to Whitefish Lake and placed in rich, deep soil near old Jack's cabin. These grew to extraordinary size and far exceeded their Pennsylvania progenitors. Some reached the headwaters of near-by streams and were carried down each spring, until most of the region showed their presence.

THE ROBIN BENEFITS BY THE ANGLEWORM'S INTRODUCTION

Meanwhile Marquette had become a systematic point of redistribution, and for a considerable time the angleworm has been found scattered along the entire south shore and at either end of the lake, there still being about 150 miles in the central portion of the north shore where I have neither seen nor heard of their presence.

If the fly fishermen are no longer concerned about the coming of the angleworm, the history of their naturalization may prove of interest to the scientist.

The robin, however, is still a beneficiary, for these worms constitute their chief diet in May and June, before the coming of the berries, and are the sole food of their first brood. Moreover, it has been noticed in the last decade that the woodcock, which once stopped briefly on their migratory flight, now linger for weeks in the alder thickets near the streams where they can always find a bountiful supply.

The gardener, too, has found a friend in this little borer, for they assist in the breaking up and enrichment of the surface soil, as the casts of this active feeder contribute much toward the quality and fruitfulness of the garden patch.

The angler and commercial fisherman, together with a large part of the public,

Photograph by George Shiras, 3d

LARGE BULL MOOSE AT A SALT SPRING ON ST. IGNACE ISLAND

The saline waters came from beneath a red sandstone stratum a few hundred yards behind the camp (see page 188).

are interested in maintaining a bountiful supply of fish, high in quality and reasonable in price, justifying their support of an effort now being made to rehabilitate the fisheries of the Great Lakes.

The recent introduction of the steelhead salmon has added another fine and adaptable fish, which, spawning in the spring, can utilize the streams for this purpose, and when unoccupied by the brooding trout in the fall.

THE SPECKLED TROUT IN DANGER OF EXTERMINATION

The species found in Lake Superior are limited in number, for the depth and purity of its water and the low temperature throughout the year have barred the coarser and less desirable kinds.

At one time the speckled trout, the lake, or so-called Mackinaw, trout, and the whitefish were present in extraordinary numbers, each occupying a somewhat different portion of the lake, according to the depth and character of the water, and all living in comparative harmony. The speckled trout depended upon minnows, insects, and crustaceans near the shore, the lake trout had an ample supply of herring, while the whitefish, a bottom feeder, in nowise interfered with the others.

There was a hardly appreciable decline in the speckled trout during the fifty years herein recorded, until it was unfortunately discovered, that during the month of August all the trout living in the lake congregated in particular streams for spawning, and these localities were then visited by an increasing number, some fishermen taking in a single day a hundred pounds of sluggish and inactive fish and often salting down the surplus for winter use.

In this onslaught others reluctantly joined; for, as the fishing became poorer each season in the open waters, they yielded on the theory that if the end were approaching, one might as well have a share in the final distribution.

Photograph by George Shiras, 3d

A COW MOOSE AT THE SAME SPRING

Here a bull moose had been illegally killed by natives just before the party's arrival and its festering body soon drove the other animals away (see page 188).

The prompt termination of this indefensible practice, and the equally bad one of running gill nets to the shore, would in a very few years restore the finest of fresh-water game fish to approximately their former numbers.

WHITEFISH FISHING WANES AS HERRING INCREASES

The whitefish, especially those of Lake Superior, have been generally esteemed as the most delicious of all fresh-water species, and when the nets were few and far apart and the methods of transportation and distribution unsatisfactory, millions of pounds were taken each season, while today, with a hundred times greater number of nets, a much higher market price, and rapid means of distribution, but a fraction is caught.

The following figures, furnished by the U. S. Bureau of Fisheries, tell the story: Whitefish, 1885, 8,000,000 pounds; 1918, 300,000 pounds. Thus it is apparent that this excellent fish is commercially extinct, but with a sufficient remnant left, if protected for a while, to be restored in waters always favorable for their support.

At one time the lake trout were in little demand, for the whitefish dominated the western markets, yet even then, with a few nets set, the annual catch approached 3,000,000 pounds, so abundant were they everywhere in Lake Superior.

The fishermen of Michigan, Wisconsin, Minnesota, and western Ontario now use sail-boats, launches and tugs for gathering the daily catch, setting gill and pound nets in all parts of the lake, sometimes two hundred feet below the surface, while larger steamers collect those taken in the more remote localities.

A DOUBLE DISASTER

Notwithstanding such a combination of efforts, the present total does not equal the number so readily taken forty years ago, with the result that the proportionately greater expenses could not now be met were it not for the extraordinary number of herring taken each fall, and these figures are significant: Herring, 1885, 300,000 pounds; 1918, 8,000,000 pounds, showing how this small and much inferior species has exchanged places with the whitefish in precisely the same period.

The present rapid consumption of the herring has become doubly disastrous, for it helps financially in maintaining the fishing fleet during their concluding attack on the lake trout, and then, with the herring gone, any future effort to restore the lake trout becomes increasingly difficult, as the latter's main food supply is thus destroyed.

Would it be possible to imagine conditions better adapted for the permanent exhaustion of the game and commercial fish in the finest and largest lake in the world?

It has long been recognized that the lack of coöperation on the part of the States and Canadian provinces bordering on the Great Lakes accounts for this situation. With each acting separately and each naturally disposed to have laws equally liberal toward their local fishermen, it follows that the State or Province spending the least money in fish culture, or having the most improvident regulations and the least efficient system of enforcement, sets the pace for the others, while the governments of each country must sit supinely by, because lacking any authorized jurisdiction over international waters in which their respective citizens have a common interest.

CANADA WILLING TO REVIVE THE TREATY

It was to meet this unfortunate situation that the United States and Great Britain negotiated and ratified a boundary waters fishery treaty, but in 1914 failure of the U. S. House of Representatives to pass an enabling act, on account of minor differences of fishermen in southern Michigan and jealousy over the proposed withdrawal of local regulations, has postponed indefinitely the operation of this beneficent agreement.

It is understood that Canada is still willing to see the treaty revived by the passage of appropriate legislation if our country will now make a move in this direction.

By such coördination of authority and coöperation in activities, the problem can be readily solved; for it is not a local question in any sense, but one that is interstate, national and international in scope.

That such a conclusion is reasonable and not speculative has already been established by the Migratory Bird Treaty, under the recent operation of which our wild-fowl are being rapidly replenished, and the more valuable insectivorous birds protected permanently in behalf of the agricultural interests of each nation.

CHAPTER VI

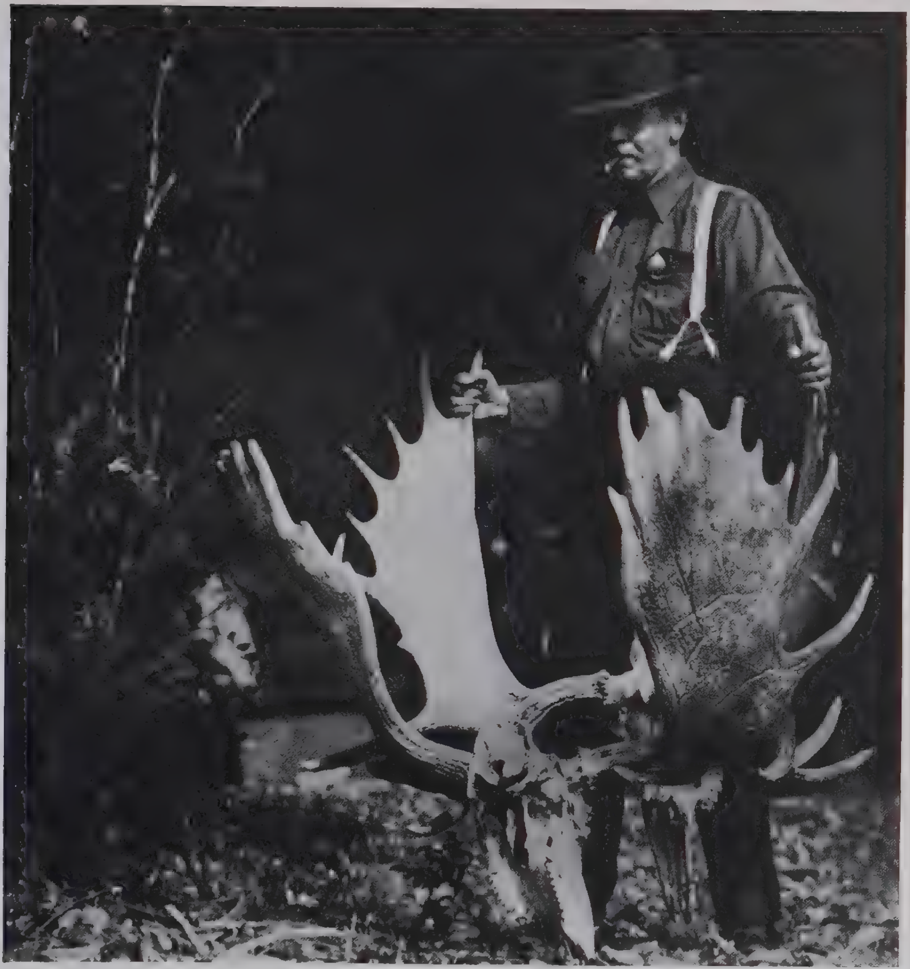
THE TIMBER-WOLF AN ANIMAL OFTEN MISREPRESENTED

From nearly every standpoint, the timber-wolf is an interesting animal, the only drawback to gaining an intimate knowledge of its habits being the extreme difficulty in finding any range where it may be successfully studied; for to a large extent its habits must be inferentially determined, this prowler of the night seldom coming under direct observation.

No animal possesses greater sagacity in avoiding its only enemy, man, and few show greater cunning and persistence in seeking their prey. If I were to be asked to give a predominating characteristic of the gray wolf, it would be its fear of man. Accustomed from our early childhood to hear of its savage nature, and seeing frequently in the press the harrowing accounts of men being pursued by these bloodthirsty creatures and escaping only by nimbleness in ascending a tree or perhaps by barricading a wilderness cabin, so conveniently at hand in such stories, it is not strange that in the popular mind the timber-wolf is still regarded as the arch enemy of man. But there is the best of proof to show that man has thoroughly terrorized this animal.

TWO GREAT CONTRASTS: THE WOLF AND THE DOG

The wolf and its descendant, the dog, present the greatest contrast in their respective attitudes toward man. One is distrustful and cunning, skulking in the shadows of the night, intent upon rending to pieces any less powerful animal, but having a dread of man so overpowering that they often die of their overexertion in desperate efforts to escape within a few hours after being trapped; and the other affectionate, loyal beyond comparison, intent upon faithfully performing



TWO PAIRS OF MOOSE ANTLERS INTERLOCKED

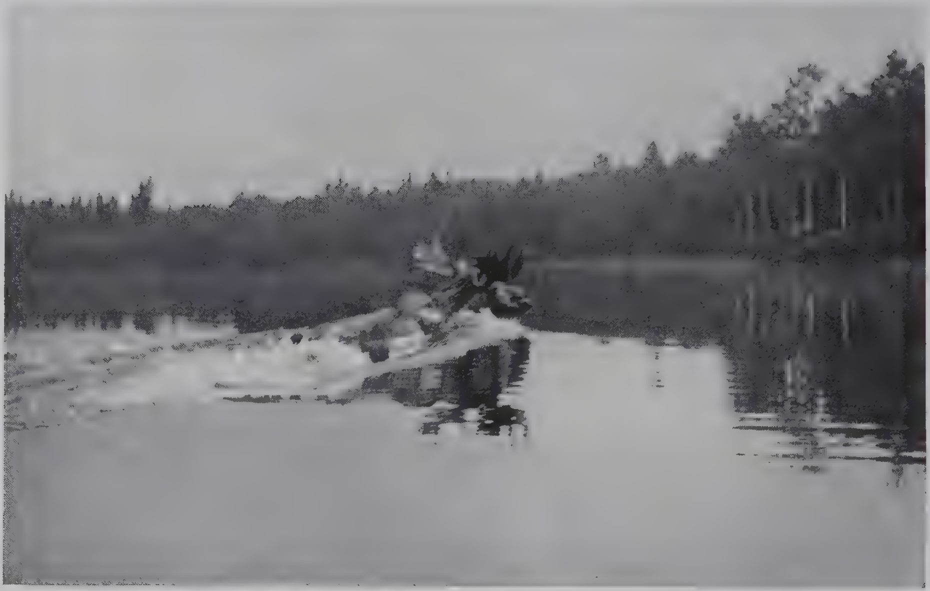
Each of fifty inches spread, inextricably joined in the deadly rivalry of the mating season, where both contestants were vanquished forever. Found near the center of St. Ignace Island (see page 188).

every service as a companion or assistant in the labors or pleasures of the day, representing the highest and most intelligent response to kindly treatment. Reversion from dog to wolf begins under a cruel master or when half starved and ill-treated by the many barbaric tribes employing the dog as a mere beast of burden.

The wolf has had every occasion to fear his human foe, for it has been trapped, poisoned, snared, shot, harassed by hounds, and a price placed upon its head. The survivors know that however much the other animals of the forest may stand in awe of them, man is ever their relentless and successful enemy, and only by the exercise of all their highly developed senses can they hope to escape the same miserable death they so ruthlessly inflict upon their prey.

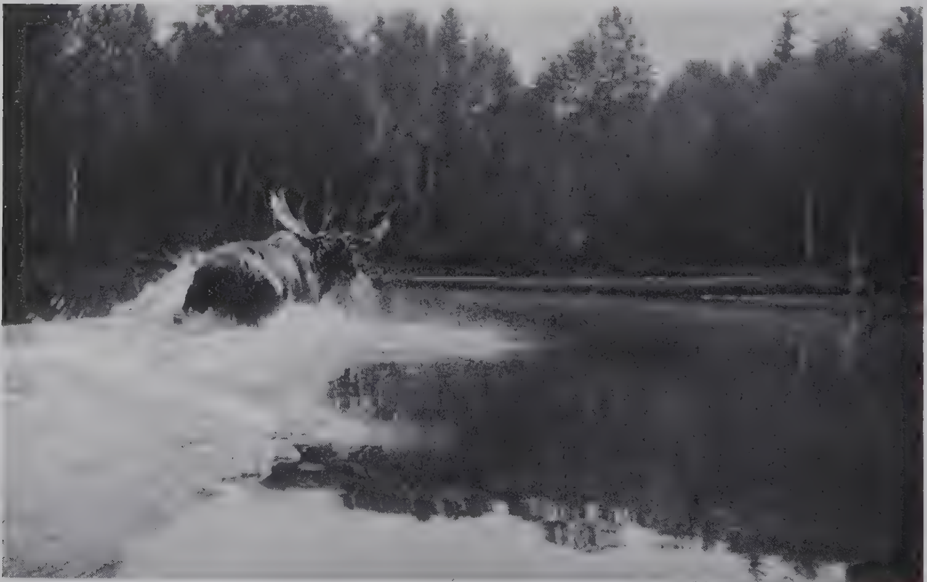
THE COURAGE AND FEROCITY OF THE WOLF GREATLY EXAGGERATED

In the years spent in some of their many ranges on the northern continent, I have never seen more than twenty wolves,



IT REQUIRED THREE PADDLERS TO KEEP ABREAST OF THIS STURDY SWIMMER

Who was feeding on water plants eight feet below the surface when disturbed by our approach (see page 188).



Photographs by Paul Swift

BREAKING THE SPEED LIMITS!

Same bull approaching the shore. Both pictures were taken with a small hand camera by one of the anglers of the party, showing what can sometimes be accomplished with a small instrument.

Photograph by George Shiras, 3d

A BEAUTIFUL LAKE ON ST. IGNACE ISLAND

This lake, four miles long and nearly dividing the island, is the largest of some fifty ponds and lakes. The western shores are high and rocky and the eastern low, with shallow bays, where forty moose were seen in two days. Many of the animals feed on the water plants, six feet below the surface. While the forests look dense, all the lower limbs have been eaten by the moose (see page 187).

although hearing them howl upon hundreds of occasions and seeing their tracks in every direction.

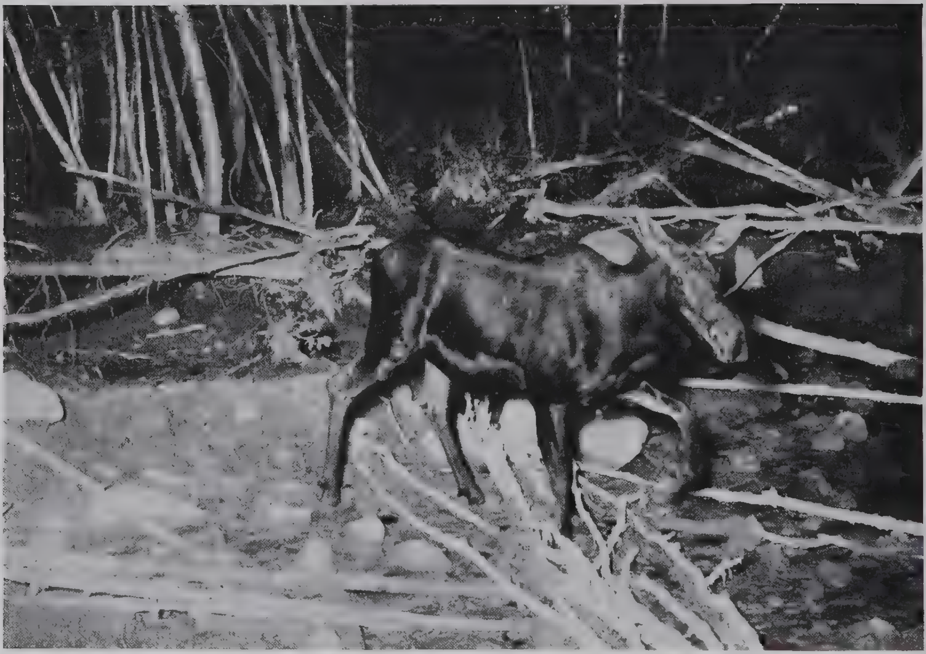
Northern Michigan was, and still is, one of the favorite resorts of the timber-wolf, owing to the dense forests and the abundance of deer and rabbits. Here I have shot a few and trapped or poisoned a dozen or so about the camp, a favorable record, considering that of the myriad of hunters roaming this section every fall, many of them, in more than half a century of hunting, have yet to see or kill their first wolf, although they number thousands about Lake Superior (see page 133).

Nowhere in America have I ever been able to get an authentic account of a man being deliberately pursued or injured by a wolf, although out of the multitude of such stories it may be that one or two are true, for the possibility always exists of an individual animal lacking the caution of its forebears or where living in a totally uninhabited country it has not inherited any suspicions of man.

Probably the most conclusive proof of the wolf's fear of a human being is the fact that every season thousands of deer carcasses in the Lake region are left over night on the ground or hung from a branch within reach, and yet are undisturbed because of the slight scent left by the hunter. Even the entrails remain untouched until all human trace has disappeared.

A WOLF SHUNS A DEER THAT MAN HAS TOUCHED

Venison is the principal diet of the Lake Superior timber-wolf, for they think and dream about it from puppyhood days, yet these keen-nosed creatures, when the air is filled with bloody odors, refrain from touching the unguarded carcasses. This should convince the most skeptical that such an animal on detecting the presence of a traveler in the woods is not likely to attack him in the flesh, since it shrinks in terror whenever discovering anything indicating human scent about a slain deer.



Photograph by George Shiras, 3d

NIGHT PICTURE OF A COW MOOSE TAKEN BY SET CAMERA AND FLASHLIGHT

This basin of clay, impregnated with salt, had been eaten five feet below the surface. Note absence of lower branches (see page 187). A quantitative analysis of the water showed: calcium oxide, 376 parts; magnesium oxide, 22; potassium chloride, 17; sodium, 615; total chlorine, 576 parts.

Such fictitious tales never come from reliable sportsmen or from experienced trappers, but are circulated by lumberjacks, land-lookers, homesteaders, inexperienced hunters, and by sensational writers, unable to tell the difference between the hoot of an owl or the cry of a loon from that of a wolf, and, besides, are ever prone to imagine or enlarge upon the supposed perils of the forest.

Twice, however, I have had a carcass of a deer eaten by wolves when left out overnight—once where the animal was shot across a small lake and I did not go to it until morning, when I found only a few scattered remnants, and again, when trailing a wounded buck in the snow, the search was suspended at dusk, and on renewing it the next morning I found several wolves ahead, but beyond where I had stopped the night before. In a few minutes there came in view the blood-stained snow, and only the bones stripped of flesh remained. In both instances there was, of course, no trace of human scent, so the wolves had no hesitation in devouring the carcass.

A WOLF THAT DIED OF FRIGHT

On one occasion, many years ago, wolf tracks were seen on the sand beach at the end of Whitefish Lake; so a large steel trap was set in the water of the creek where a deer runway crossed it, and the same night I heard a wolf howling in that direction.

In the morning, on entering the slough, I fired at a pair of black-ducks passing overhead, and on reaching the place where the trap had been set, found it gone, some of the alders in the vicinity being uprooted, caused by the temporary catching of the clog. Upon reaching the opposite bank I found other alders had been torn to shreds, many of them still dripping with blood from the torn mouth of the wolf as it frantically tried to escape.

Believing a rifle might be needed in the more open ground, where the clog

Photograph by George Shiras, 3d

VIEW OF AUTHOR'S CAMP FROM THE SWIMMING POOL: WHITEFISH RIVER

The pictures of deer and other animals in the garden were taken between the two upper buildings shown on either extreme, while the beaver, muskrats, mink, and raccoons, as well as some deer, entered by the river front (see pages 188-193).

could be dragged readily, I returned to the camp for one. Taking up the hunt again, I soon noticed a large wolf lying on the ground with its head between its paws, almost as if asleep. On approaching the animal it was found to be dead, its body still warm.

It had probably been held fast by the clog when it heard the shot fired at the ducks, which accounted for the bloody alders, as the animal frantically renewed its efforts to escape. On reaching the hilltop the accumulating terror of its position undoubtedly resulted in death.

THIS WOLF COLLAPSED WHILE BEING PHOTOGRAPHED

That this instance is not exceptional was proved three years later in the same locality, where a wolf was trapped one night and again it howled. On the following morning, with rifle and camera, I visited the spot. The trap was missing, but the animal had not gone more than twenty yards when the log attached to the chain caught, and as I approached, the wolf raised itself to a sitting position. While I was clearing away the thick alders for a picture, it sank to the ground, with every appearance of complete exhaustion, and only by a severe prodding would it arise.

On the first snap of the camera, the animal collapsed, refusing to stir again. I certainly never expected to be sorry over the plight of such a marauder; but its bloodshot eyes, protruding tongue, the entire lack of resistance, and the dreadful sight of the broken skin clustered white with the eggs of the blue bottlefly would have appealed to the sympathy of its most relentless enemy; so a shot hastened the end.

From its condition it was plain that the animal was in the throes of death, due not to any injury, but to an overpowering mental strain, producing a complete physical collapse, and that, too, of an animal weighing eighty pounds and in the best of physical condition.

RESOURCEFULNESS OF THE TIMBER-WOLF

An illustration of the elusiveness and endurance of the timber-wolf occurred when one was found on Grand Island, in the fall of 1896. The first snow showed its presence, besides disclosing a large number of deer carcasses, including several of the imported black-tails.

Thereupon a large number of traps and poisoned bait were set out, but without result.

Then, to insure its destruction, a dozen of the best shots in the vicinity were em-

Photograph by George Shiras, 3d

A LARGE MINK TAKES ITS OWN PICTURE AT NIGHT

This is a representation of the animal that took, on a number of successive days, a victim from among the white ducks in the swimming pool, Whitefish Lake (see page 190).

ployed to hunt the animal. Taking up the trail in the snow, it was followed continually in the daytime for four days, when the animal was slightly wounded, which only increased its watchfulness.

At the end of nearly two weeks, with relays following it all day and sometimes at night with lanterns, the wolf was finally killed. With the wages paid and the loss of deer destroyed by this single animal the cost was estimated at $1,500.

That an animal on an island, where it could be readily followed in the snow, was able to escape such a number of experienced hunters during this length of time shows how hopeless would be a similar pursuit on the main shore, where the avenues of escape are infinitely greater.

In the past fifteen years the coyote unexpectedly appeared in northern Wisconsin and Michigan, coming from Minnesota. It has since become very numerous, feeding on rabbits and killing many young deer, besides threatening the sheep introduced in the cut-over lands.

Some twenty of these animals have already been trapped on Grand Island, a game preserve described in subsequent pages, and many are taken each year to the mainland. In weight they exceed those of the prairies, evidently responding to the heavily wooded area and the nature of their prey.

CHAPTER VII

USE OF THE CAMERA IN THE DAYTIME

In previous issues of this Magazine* I have described with considerable detail

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* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Wild Animals that Took Their Own Pictures by Day and by Night," July, 1913; "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon." June, 1911; "One Season's Game-bag with the Camera." June, 1908, and "Photographing Wild Game with Flashlight and Camera," July, 1906.

Photograph by George Shiras, 3d

A BEAVER VISITING THE BOAT-HOUSE IN FRONT OF CAMP: WHITEFISH RIVER

This large beaver discovered a couple of young black ash and was tempted to visit the camp clearing. Where is its tail? At no time in six years have the river beavers been seen in daytime (see page 190).

the methods employed in nature photography, both by day and night, but have omitted largely the history of its gradual development, or how it has been used by the naturalists and sportsmen as an aid to science or the establishment of a new pastime; so some additional information is not out of place.

In looking over my diaries, beginning in 1878 and continuing to date, the following brief entry appears in 1886:

"WHITEFISH LAKE, *July* 7-9.—First day wounded bear on the way out; saw two deer in camp clearing. Second day photographed a deer. Guide, Jake Brown."

At the time indicated I owned a 5 x 7 landscape camera with a single lens, of slow speed, which had to be uncapped when an exposure was made; so a tripod was generally necessary. In some respects this instrument proved more satisfactory for scenic pictures than the modern outfit, for the use of the tripod in focusing and in the study of the field to be included, besides the small aperture of the diaphragm, resulted in well-defined negatives and also precluded the carelessness so customary with a snapshot camera.

When the time finally came that the vacation was limited to the summer months, with an occasional brief hunt in the fall, the opportunity for outdoor sport was greatly reduced, but the "call of the wild" became intensified by the confinement and exactions of city life.

On these summer trips, in seeing the wild animals in the woods and about the waters, there was a lamentable lack of the interest aroused when the gun was in use. To paddle within range or cautiously approach some clearing and then see an animal slink away became monotonous to one accustomed to a keener and more exciting sport.

THE FIRST ATTEMPT TO PHOTOGRAPH A DEER

Likely it was this feeling which led to my suggesting to Jake Brown (the worthy successor to Jack La Pete) the possibility of photographing a deer. So one afternoon the flat-bottomed hunting

Photograph by George Shiras, 3d

A VARYING HARE IN A STRIKING ATTITUDE

Rarely is this animal seen in sunlight, for it feeds by night, but the white clover in the camp garden made it a frequent daylight visitor (see page 190).

skiff was prepared for the experiment, with a few green boughs in front screening the camera.

On entering the lake, an unusually large buck was seen standing upon a submerged rock opposite. Paddling through the reeds slowly, we came to open water fronting the animal, and as the bow cleared the reeds we were within forty feet of it, as it stood in a striking attitude. At this instant the boat, fortunately, ran on top of a sunken log, steadying it for the picture.

Quickly the cap was removed from the lens and then replaced. The deer, however, detecting this slight movement, ran a short distance, when it stopped, with head high in the air, gazing anxiously in our direction.

TWO PICTURES SPOILED AT ONCE

Meanwhile I had replaced the slide, reversed the plate-holder, and had time to make a second exposure, when with a single leap the animal cleared the bushes fringing the water.

More excited than if I had killed this splendid specimen, the slide was picked up to cover the last exposed plate, when I was stunned at seeing the light-colored negative staring me in the face, for I had withdrawn the outer slide while watching the deer moving off, thereby destroying the first negative and not exposing the second.

Jake, of course, could not understand how it was possible to spoil two pictures by a single mistake; so, without any undue discussion about the manner in which I had blundered, the boat was headed for the slough, where a large doe was ready for the next effort. Somewhat suspicious of the partly screened boat, she allowed time for the removal of the cap, but before it could be replaced she ran back into the forest. On developing the plate, there could be seen the faint outline of the doe, and then a long white streak representing her retreat.

Following this short experience, it was apparent that only by the best of luck was it possible to get pictures of deer with such an outfit, and while just such luck had favored the initial effort, "buck fever" of the earlier days had brought almost complete failure.

THE FIRST PHOTOGRAPHIC APPARATUS OF ITS KIND

Several seasons previously, a friend of mine had procured a 4 x 5 outfit, called the "Schmidt Detective camera," having a high-grade, rectilinear, Dallmeyer lens, with a fairly rapid shutter, which could be set and released by a string and button on the outside of the box. This apparatus, which was the first of its kind, equaled the modern ones in effectiveness, and for my purpose proved very much better, for the plate-holders and lens were inclosed in a light, tight, waterproof box.

Using this camera, during the next season I was able to get several good pictures of deer. The lens, however, was of short focus, so it was necessary to get within about twenty-five feet of an animal for satisfactory results, and this was difficult in bright sunlight. So then I tried sitting in a blind near a runway or

Photograph by George Shiras, 3d

A GREAT BLUE HERON OPPOSITE THE AUTHOR'S CAMP

Frogs in the reedy shore across the stream attracted the blue herons, but the camp was watched closely by these cautious birds, Whitefish Lake (see page 190).

where the deer came to feed, but the shifting currents of the air usually indicated my presence before the quarry approached close enough, showing the difference between shooting an animal some distance away and trying to photograph it within a few yards.

ANIMALS MAKE THEIR OWN PORTRAITS

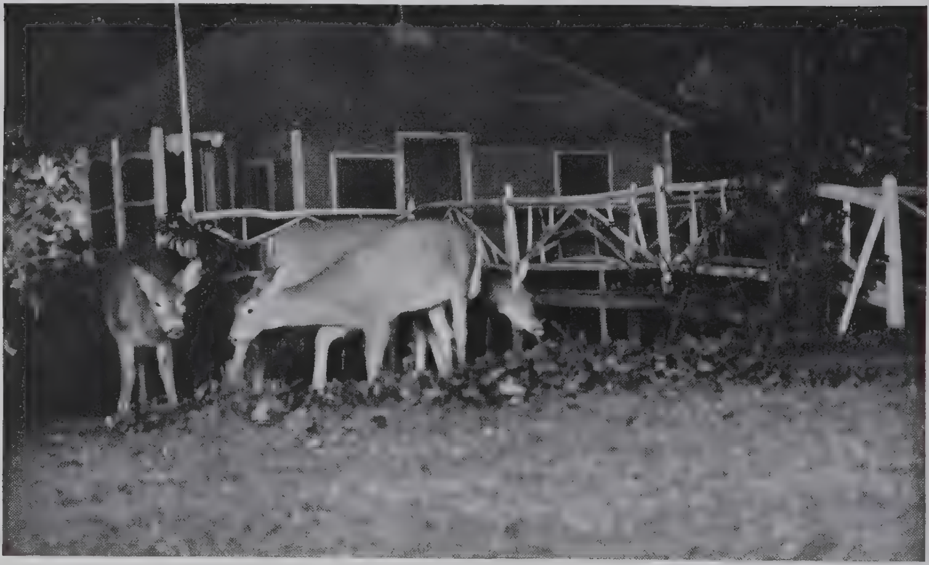
During subsequent seasons this difficulty was overcome by running a thread across a runway or the beaches, with the camera concealed a short distance away, and in this manner pictures were obtained without effort and of very excellent quality. Later, when leaving the camera out all day, it could be reset for night with a flashlight, and thus it was at work twenty-four hours—an important advantage when in the remote wilderness for a brief time.

Another method was to place two or three cameras in different parts of the slough, and when an animal passed in front of one the shutter was released by pulling a string suspended through screw-eyes on saplings and running thence to a scaffold in a tree overhanging the water, where I could release the shutter of a camera by pulling the right string, the deer always stopped when I gave a shrill whistle (see page 134).

It seems odd now that in the beginning I had selected as an object for the first camera hunts the most cunning and elusive of the deer family instead of trying an easier subject, like a porcupine, a squirrel, or some of the many semi-tame birds nesting in the clearing about my camp. Of course, the explanation lay in the fact that I simply wanted to hunt deer, and the camera gave the means of gratifying this desire.

A QUOTATION FROM THE PAST

Soon the real and lasting merits of this instrument as a sportsman's adjunct became more and more apparent, and in such belief I wrote in advocacy of this new pastime an article published in 1891. It indicates a violent reaction against useless destruction, but it at least bears witness to a confidence in the camera as the sportsman's best friend.



Photograph by George Shiras, 3d

A DEER FAMILY FEASTING ON MOUNTAIN-ASH BERRIES BEFORE THE BOAT-HOUSE

These wild berries were so placed that deer passing toward the garden would fire the flashlight, showing the boat-house in the background (see page 191).

"A sportsman's life consists largely of three elements—anticipation, realization, and reminiscence. The look forward to the trip by rail, by canoe, and then perhaps a tramp on foot into the heart of the wilderness; then the camp and its pleasant surroundings, and that memorable day when the early morning sun casts a glint upon the branching antlers of a mighty moose as, half concealed in the thicket, he furtively browses his way along; the breathless wait until the neck or shoulder becomes exposed; the shot, and then—success—that is, sudden death, or perhaps delightfully intensified by a hasty scramble after the wounded beast on a blood-stained trail, at the end of which we find our victim dead or dying.

"Would that we could realize that what is game to the rifle is game to the camera! Nearly every sportsman will admit that the instant his noble quarry lies prone on the earth, with the glaze of death upon the once lustrous eye, the graceful limbs twisted in the rigors of death and the tiny hole emitting the crimson thread of life, there comes the half-defined feeling of repentance and sorrow.

"The great desideratum, after all, consisted of neither meat nor antlers nor hide. Therefore the conclusion is reached that much of the large game, when successfully hunted, is the victim of an abnormal incentive.

"Surely we do not travel a thousand miles, indifferent to time, labor, and expense, to get a few hundred pounds of wild meat, probably not half so toothsome as the domestic cuts in the market stalls of our own town and costing very much more.

THE THRILL OF THE CAMERA HUNT

"Every camera hunter will admit, even though once a successful sportsman, that there is more immediate and lasting pleasure in photographing a deer at twenty yards than in driving a ball through its heart at one hundred yards. Then, think of the unlimited freedom of this noiseless weapon. No closed season, no restriction in numbers or methods of transportation, no posted land, no professional etiquette in the manner of taking your game.

"You can pull on a swimming deer or an elk floundering in the snow; take a crack at a spotted fawn; bag the bird in its nest or string your cameras out with a thread across the runway and gather in

Photograph by George Shiras, 3d

VISITING THE CARROT PATCH

This doe selected its favorite vegetable within ten feet of the cabin containing the dining-room, wherein many a haunch of venison has been served during the hunting season. At no time are these night visitors seen in or about the garden in daylight. Cautious as they are, many of them lose their lives in the hunting season, a few months later, in which hunts the writer no longer participates (see page 191).

the exposed game-laden plates at nightfall without any scruples of being called a pot-hunter.

"By and by you will have a collection of pictures affording more enjoyment than all the mental ghosts of slaughtered quadrupeds and all the moth-eaten relics of the gun; for, when one covers an elk or a moose with his single barrel, close shooting, long-focus lens, there is no pulling off the hide while the coyote and the birds of prey feast on a thousand pounds of meat too rank in the rutting season for food or too cumbersome, if edible, to be generally available.

"In each essential particular the camera requires all the proficiency and affords all the pleasure that a steady hand and a deadly weapon ever gave a lover of field sports, and more besides.

"It is only within the last few years that compact photographic appliances, quick shutters, rapid dry plates and films have made possible successful work on large game, or otherwise some of us might have reformed before."

Whatever may have been the writer's particular contribution toward wild-life photography in the daytime, it was of a non-essential character, so far as the immediate future was concerned, for the method would soon have developed naturally on the coming of proper apparatus.

A year or two later Wallahan, of Colorado, on his own initiative and with an ordinary tripod camera, succeeded in getting a remarkably beautiful series of the mule deer during their descent from the mountains each fall, and later, with better equipment, photographed many other animals in his State.

Then Chapman, our leading ornithologist, began picturing birds, his collection not being surpassed by any individual at the present time; followed by Kearton, of England, who soon became the foremost bird photographer across the seas.

The next effort of the writer was to

try photographing animals at night by flashlight, about the waters in the vicinity of his camp. In this experiment many difficulties arose, which may best be considered as a separate subject.

WILD LIFE PHOTOGRAPHY BY NIGHT

In the earlier days, about Lake Superior, the old Indian method of "fire-hunting" deer proved most fascinating. True, this practice has long been outlawed as unsportsmanlike, since it required little skill and became very disastrous when followed systematically by market hunters.

Even at that time, the real pleasure in hunting at night, to most of us, was not so much the actual shooting as the keen enjoyment derived in paddling quietly along the winding streams or the well-wooded shores and bays of some inland lake, where in the quietness of the night every sound was audible, and one readily learned to know the different animals before they came within the circle of the light.

Unless the primary object was obtaining meat for camp, it was disappointing if a deer were killed within the first half hour, thus ending the trip.

Another method of night hunting was the use of a headlight on shore, the hunter quietly wandering about in the blackness of the forest looking for a pair of gleaming eyes, fifty or more yards away, and then with a rifle trying to put a ball between the few inches separating these brilliant orbs, requiring an accuracy of aim, a knowledge of the woods, and a skill in still hunting quite up to the standard in daylight shooting.

But here again the market hunters became so proficient under conditions already described that this method also had to be prohibited.

THE IDEA OF NIGHT PHOTOGRAPHY CONCEIVED

Having taken daylight pictures of deer in various ways, the question then arose whether there was any possible means of doing this at night, when the deer were much more active and could be approached more easily than at other times, thus reviving, in a harmless but interesting way, jack-light hunting, so little known by those of the present day.

Assured by an extended experience in both methods of hunting under the light, there seemed little doubt about getting close enough for pictures, provided the magnesium powder was a sufficiently powerful illuminant and had the requisite speed.

"SHOOT THE DEER FIRST"

This new endeavor was mentioned to Jake Brown in the summer of 1889, but he was still a trifle irritated over an experience of the previous fall, when, after the season had opened, I photographed a fine buck and shot at it afterward, resulting in badly wounding the animal as it ran away, entailing a half day's search before it was overtaken and put out of misery, for the lower jaw had been crushed by the rifle ball, giving a pitiful illustration of how some animals must suffer in the name of sport.

This led Jake to exclaim that if the camera must be used, the best thing to do was to shoot the deer first and photograph it afterward! However, as the season would not open for several months, he got the boat ready for the night, while I attempted to devise some sort of a flashlight apparatus.

A small hole was made in the center of a tin plate, in which was placed a strip of oiled paper that would burn readily when ignited underneath, and on top was placed the magnesium powder.

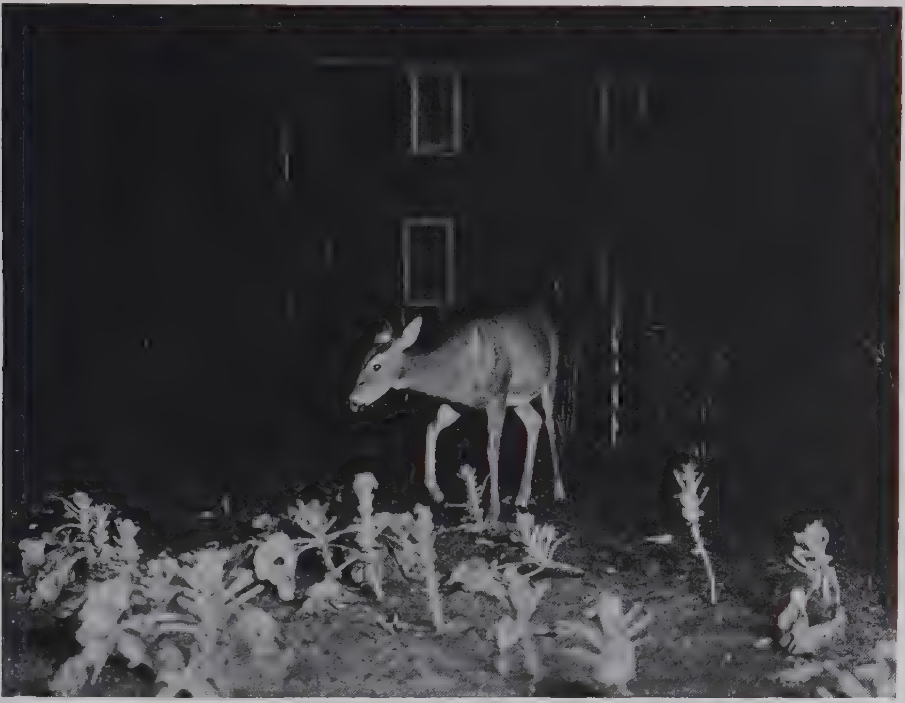
The approach was to be made in the usual way, with a jack-light.

FIRST ATTEMPT PARTLY SUCCESSFUL

This first effort was entirely successful, so far as getting within range; but just as the lower end of the paper fuse began burning, the deer ran off with a snort of disapproval, the flash taking place after it was out of sight. Jake, as might have been expected, indulged in his usual guffaw, while I hopefully began preparing another charge.

At the left-hand corner of the sand beach stood a large doe, much interested in the approaching light, and soon the boat came within 25 feet, the flashlight being fired when the animal was apparently motionless.

On developing the negative the body of the deer was satisfactory, but the head had moved so violently the animal seemed decapitated.



Photograph by George Shiras, 3d

FINISHING UP THE BRUSSELS SPROUTS

This deer took its picture at midnight before the cottage of the caretaker, whose sleep was doubtless momentarily disturbed by the explosion. But, as such raids were a continual strain on the temper of the gardener, he always welcomed the sound of the flashlight (see page 191).

This unexpected result was discouraging, so several trials were made the following night; but again the pictures were nearly worthless, for the same reason as the first, showing that the powder was too slow for an active creature like a deer when facing a slowly exploding illuminant.

Later experiences proved, however, that even with this crude apparatus a good picture might have been taken occasionally had the flashlight been discharged when the deer had its head down or was turned away from the water.

During the ensuing winter I learned of a flashlight apparatus designed for taking pictures in theaters, ball-rooms, or other large interiors, consisting of a metal standard supporting three circular alcohol lamps, into the flames of which could be projected a spray of magnesium powder by means of a rubber bulb connected by tubing with a receptacle containing enough powder for half a dozen flashes.

This apparatus, with its great power of illumination and ease of manipulation, seemed suitable for solving the problem.

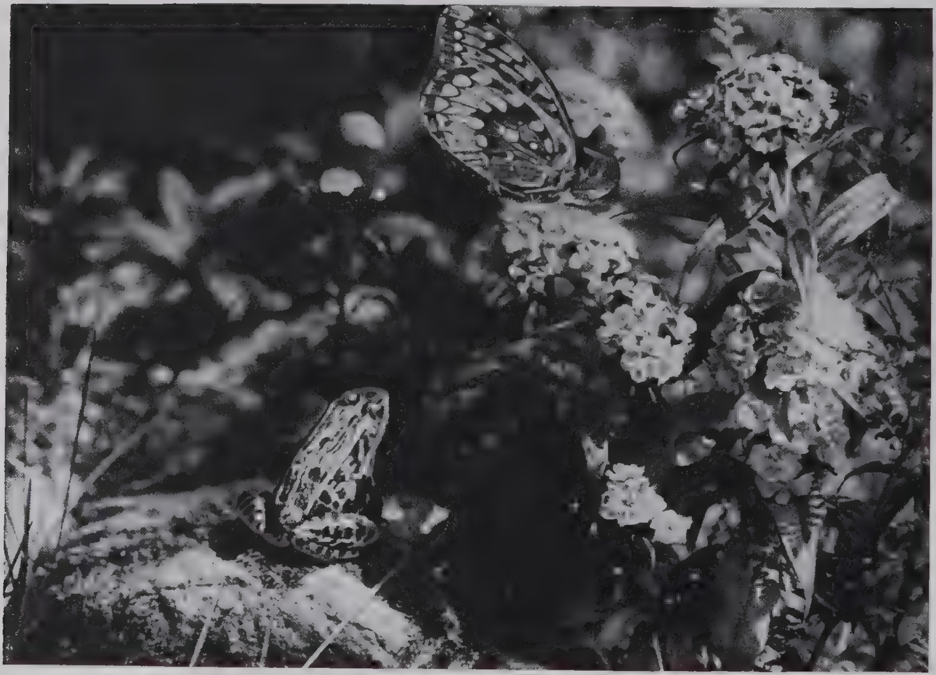
UNEXPECTED PYROTECHNICS

On the first dark of the moon the following July I left camp in a canoe with the new outfit in the bow and the ever-faithful Jake astern, going downstream from camp to avoid the winds of the open lake.

A reflector had been placed behind the three lamps with the idea of covering the jack and utilizing the other light when finally approaching a deer.

In one place it was necessary to lift the canoe over half-submerged rocks; but, as we both wore gum boots, this was easily done. Shortly afterward it was realized that this little portage had probably saved the flashlight hunter from severe injuries.

On rounding the next bend a pair of



Photograph by George Shiras, 3d

A DOZEN FROGS CATCH NEARLY ONE THOUSAND BUTTERFLIES

Early in August, 1919, the half dozen little Leopard frogs living in the camp water garden near Whitefish Lake were seen catching, every few minutes, butterflies known as "the little white-banded blues," as each alighted on a row of forget-me-nots bordering the water. Frequent observation during a week indicated the killing of fully 500 butterflies. On the bank of the stream was a bed of sweet-william, where another set of the little green frogs lay in wait, these catching a brown species (shown above) almost as frequently. It is worthy of note that two distinct species of butterflies fed exclusively on two different species of domestic flowers. The brown butterflies, however, fed by the hundreds on joe-pye weed along the stream, but beyond reach of the frogs. The photograph was made from above, causing the butterfly (*Argynnis aphrodite*) to appear disproportionately large.

glowing eyes attracted attention, and in a moment the three lamps were ablaze and the jack-light covered. On approaching, the deer jumped to one side, requiring the canoe to change its course, for I had not then in use a revolving table capable of covering any quick movement of an animal.

In turning to whisper instructions to Jake, my elbow unfortunately caught on the rubber tubing, toppling the entire apparatus into the bow, where the cap of the reservoir became detached, permitting the escape of all the powder, part of which clung to the wet surface of the rubber boots, the remainder going into the bow, where a portion was set on fire by the overturned lamps.

There was a tremendous explosion of the drier powder, and the damper portion gave forth a brilliant spluttering, compelling me, in a cloud of stifling smoke, to leap overboard in order to extinguish the blaze on the boots and later in the boat.

Having been turned toward the paddler when the mishap occurred and because much of the powder was wet, my eyes were protected, affording an early warning in the handling of such an explosive.

JAKE GETS A DUCKING

When Jake learned that no particular harm had been done beyond the puncturing of a chimerical scheme, he gave vent to unrestrained mirth. Standing waist deep in the slowly moving current, my hands smarting from the touch of the flames, and the little camera floating about in the murky waters, any humor in the affair was not particularly noticeable to at least one member of the party.

Opening the cover of the jack-light and turning the rays toward the stern, the sight of Jake in a state of hilarity, with a superabundance expressed by whacking the paddle on the water in rhythm with each outburst, I gave an upward pull on the already-elevated bow of the canoe, and down went the stern to the bottom, only Jake's eyes showing above the surface, stifling every sound except a little spluttering.

As Jake struggled to his feet, a grinning countenance showed his willingness to take good-naturedly this somewhat rude form of reprisal. In a few minutes the boat was ashore, the water removed, and the camera found on a near-by sandbar. While returning, my now sympathetic assistant attempted a diversion by pointing out in graphic language how surprised the deer must have been "when the moon blew up," but the monologue was not interrupted.

A SUCCESSFUL FLASHLIGHT APPARATUS IS DEVISED

In the succeeding months experiments were made with a new powder, called Blitz-pulver, a compound possessing great brilliancy and rapidity, and only requiring an apparatus that could be quickly and safely handled to insure satisfactory results.

Sportsmanlike, the idea of a pistol flashlight then suggested itself.

During the winter I had made a tin box an inch deep and seven by four inches wide, containing an iron bed-plate on which a spring-actuated firing-pin could be released by a trigger beneath the box, using for ignition a capped, but empty, pistol cartridge, which extended through an upright shoulder far enough to penetrate an opening in a pill-box containing half an ounce of powder.

This contrivance, when tested, showed it could be fired with the quickness and certainty of a gun, the strong metal bedplate protecting the hand when the machine was held overhead.

On next returning to camp in the summer of 1891, I found that Jake would be occupied several months building a hunting cabin for a relative of mine on a little lake several miles to the west; so the next experiment had to be tried with a different paddler in the stern.

Fortunately, a good substitute was at hand, for some years previously I had employed, occasionally about the camp, but more frequently in fishing along the shore, a Norwegian named John Hammer. Although a machinist by occupation, since coming to this country, in the early eighties, his racial fondness for the water led his employers to take him on camping trips, where his expertness as an oarsman, a paddler, or in running a naphtha launch finally led him to act as a guide during the summer and fall months.

Sending for John, I explained that he was to take on a novel occupation, that of "a flashlight guide," and for an indefinite period, little anticipating his continuance in that capacity to the present date, a period of more than thirty years and covering expeditions throughout much of the northern continent.

John accepted this invitation with surprising cheerfulness, for in those days the idea of using a camera instead of a gun did not take very well with most guides, who naturally thought that in hunting big game there should be something more substantial to show than the image of what, in the flesh, represented a fine stew or roast.

Perhaps part of the explanation lay in the fact that at his own former home in Christiania he had served as an apprentice in an optical works and had always felt a considerable interest in photography, thereby viewing his new duties with a seriousness and appreciation speaking well for my future efforts.

One night about the middle of July, in the following year, the new apparatus was put into the canoe and a start made up the river under the confident belief of a greater measure of success than had heretofore fallen to my lot.

THE FIRST SUCCESSFUL FLASHLIGHT OF A DEER

On the way to the lake several deer bounded off, but too far away for a picture. Passing along without looking for any animals in the reeds, as the open shore of the slough afforded a less obstructed view, we entered it with no idea of seeing a deer for several hundred yards, and were, therefore, surprised on discovering a pair of shining eyes of what proved a yearling buck, only a few feet beyond old Jack's landing, where, as a boy, I had brought in triumph a little buck as the first victim of the gun.

What a coincidence if, on the same spot, I could now obtain an image much more lasting than the vanished one of years ago!

The deer viewed the approaching light with unusual curiosity, raising and lowering the head as if to look under or over the jack-light. Just as the neck was craned and the head elevated, the flash was fired, the camera hunters and the deer being equally blinded, for at that time we had not learned the advantage of closing one eye when the explosion took place.

Before our vision had returned the deer was heard struggling through a mass of alders, and then, without making another trial, we hastened to camp, where the developed plate showed the little buck in the center of the scene, with a foreground of reeds and a background of alders and cedar, depicting the first successful effort in the recording of an animal on its midnight rambles (see page 135).

THE LURE OF NIGHT HUNTING WITH A CAMERA

Having, therefore, learned in the succeeding year that night hunting with the camera possessed a greater attraction for the average sportsman than when the object was the death of the animal, I endeavored to show this through the columns of an outdoor magazine, and as a part of the present record its reproduction may be in order, especially as these early views have been more than sustained in the twenty-five succeeding years:

"Selecting a dark, warm night, a flashlight hunter prepares his cameras, lights the jack-lamp, loads his flashlight apparatus with magnesium powder, and in his canoe pushes out into the silent waters of the lake or river. The paddle sends the slight boat ahead so easily that no sound is heard except a gentle ripple, unnoticeable a boat's length away. The wooded banks are wrapped in deepest shadow, only the sky-line along the crest showing their course.

"At the bow of the boat the bright eye of the jack-light is turning from side to side, cutting a channel of light through the waves of darkness, showing, as it sweeps the banks, the trunks of trees and tracery of foliage with wonderful distinctness.

"Soon the quick ears of the men in the boat detect the sound of a deer feeding among the lily beds that fringe the shore. Knee-deep in the water, he is moving contentedly about, munching his supper of thick green leaves.

"TWO BRIGHT BALLS SHINE BACK"

"The lantern turns about on its pivot and the powerful rays of light sweep along the banks whence the noise came. A moment more and two bright balls shine back from under the fringe of trees; a hundred yards away the deer has raised his head and is wondering what strange, luminous thing is lying out on the surface of the water.

"Straight toward the mark of the shining eyes the canoe is sent with firm, silent strokes. The distance is only seventy-five yards, now it is only fifty, and the motion of the canoe is checked till it is gliding forward almost imperceptibly. At this point, if the hunting were with the firearm, there would be a red spurt of fire from under the jack-light, and the deer would be struggling and plunging toward the brush; but there is no sound or sign of life, only the slowly gaining light.

"Twenty-five yards now, and the question is, Will he stand a moment longer? The flashlight apparatus has been raised well above any obstructions in the front of the boat, the powder lies in the pan ready to ignite at the pull of a trigger; everything is in readiness for immediate action. Closer comes the boat, and still the blue, translucent eyeballs watch it. What a strange phenomenon this pretty light is! Nothing like it has ever been seen on the lake during the days of his deerhood.

"A CLICK, A WAVE OF LIGHT, THEN DARKNESS"

"Fifteen yards now, and the tension is becoming great. Suddenly there is a click, and a white wave of light breaks out from the bow of the boat—deer, hills,

Photograph by George Shiras, 3d

BEAVER REPAIRING DAM AT NIGHT

For the purpose of showing a dam and the beaver at work on it, a break was made one afternoon, and when the animal came after dark to investigate the cause of the falling water, a set camera and flashlight pictured it within the break. Taken in October, 1912, 45 miles west of Marquette (see page 197).

trees, everything stands out for a moment in the white glare of noonday. A dull report, and then a veil of inky darkness descends.

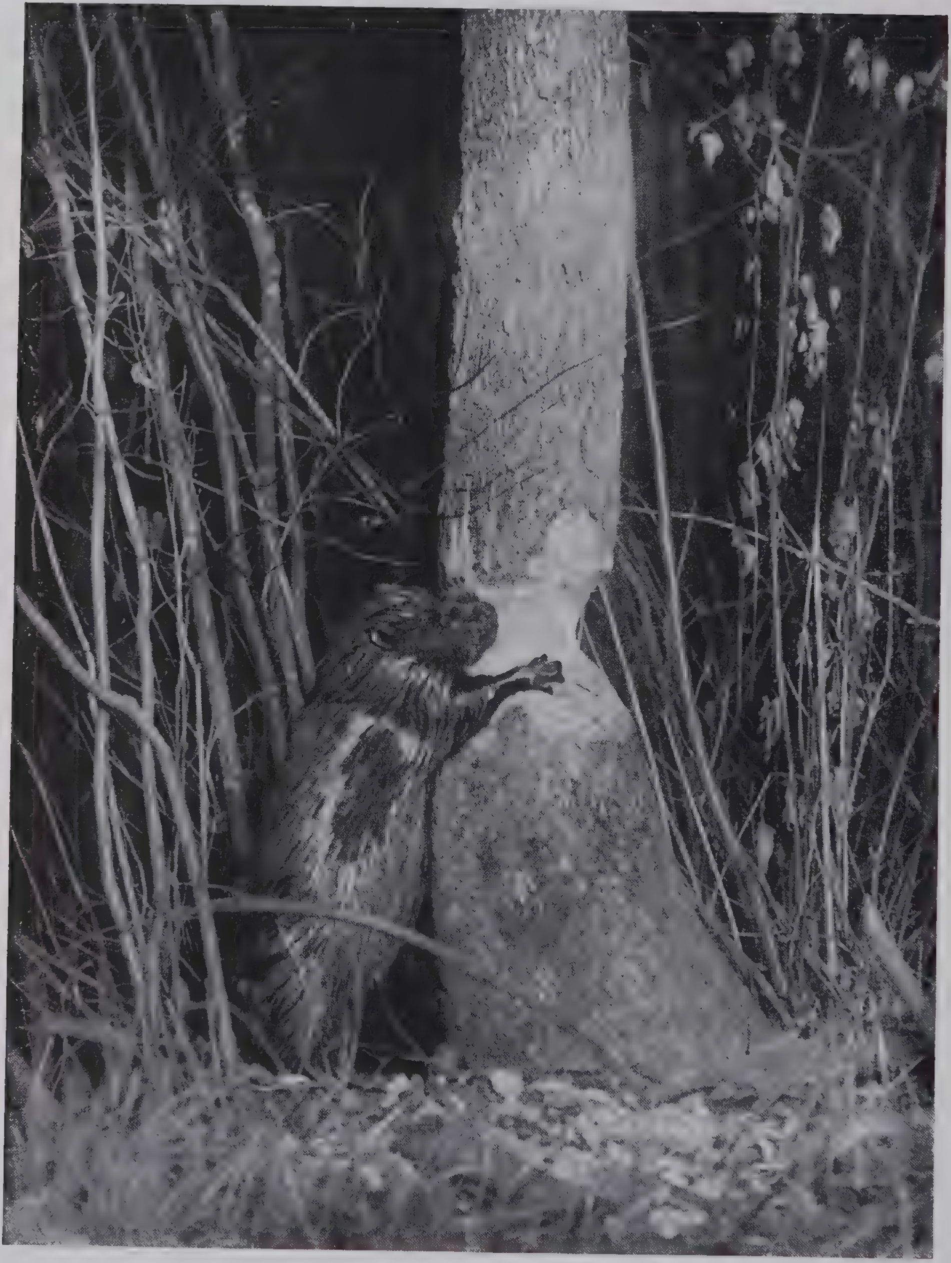
"Just a twenty-fifth of a second has elapsed, but it has been long enough to trace the picture of the deer on the plates of the cameras, and long enough to blind for the moment the eyes of both deer and men. Some place out in the darkness the deer makes a mighty leap. He has sprung toward the boat and a wave of water splashes over its occupants. Again he springs, this time toward the bank. He is beginning to see a little now, and soon he is heard running, as only a frightened deer can, away from the light that looked so beautiful, but was in fact so terrifying.

"What an account he will have for his brothers and sisters of the forest of a thing which he himself would not have believed if he had not seen it with his own eyes. In the boat, as it slips away from the bank, plates are being changed and the cameras prepared again for another mimic battle."

MAJORITY OF WILD ANIMALS ARE NOCTURNAL

In the course of time it became plain to the writer that the easiest and most satisfactory method of picturing wild game was through the use of the flashlight, for by far the greater number of wild animals are nocturnal, and when occasionally seen in the daytime can rarely be approached sufficiently near with a camera or when the light is favorable.

However, it was many years before any one else could be induced to make the effort, for it seemed hard to find one who was both a naturalist and a photographer,



Photograph by George Shiras, 3d

BEAVER CUTTING DOWN A BLACK ASH AT NIGHT: THE FIRST PICTURE OF ITS KIND

For two weeks the camera and flashlight faced this partly cut tree without result. Then one night the beaver came, leaving his picture as well as the tree, for it stands today unfelled, proof that a single animal does the work (see page 197). He was too frightened by the flash to return that season.

or, being such, had any knowledge in the use of flashlight powder and the means of approaching animals at night.

Finally, many years later, Nesbit and Dugmore, of this country, became interested, followed by Schilling, of Germany, the latter two of whom obtained remarkable night pictures on their African expeditions. Then came a host of others, whose fine and ever-increasing collections indicate the success and permanency of this method of night photography, both as a sportsman's pastime and for the scientist, when desirous of presenting wild life in its natural habitat.

PHENOMENA OF FLASHLIGHT COMPOUNDS

The range of illumination, out-of-doors, of the modern flashlight powders is limited in animal photography to about fifty feet, unless a very heavy charge is used, in conjunction with a long-focus lens.

However, the direct and collateral rays of this powder have an extraordinary range.

Homesteaders living four or five miles beyond the author's camp for some years have noticed the sudden glare of light on the sky overhead, and by inquiry finally traced the origin to the flashlight pictures being taken at or near the camp.

This led to a careful and more extended test. By prearrangement, an ounce or so of flashlight powder was fired one night in the camp, surrounded by high trees, while well below the horizon at Marquette, 20 miles distant, spectators were to report the result. They noticed a bright illumination, not only above the camp site, but its extension apparently for five or six miles along the horizon, resembling heat lightning, except for its steadiness and straight lines. Subsequent trials did not vary.

Flashlight rays will penetrate clear water for a considerable distance at night, making possible subsurface pictures, so difficult of accomplishment in the daytime, and will also permit the photographing of the interior of a room through closed windows, when the camera and flashlight are at a considerable distance on the outside—an impossibility in daylight (see picture, page 191).

Moreover, when these rays come in contact, at right angles, with those of a strong searchlight, a mile away, there appears a peculiar and very noticeable fluttering at the junction, not unlike heat lightning. This too, was tried a number of times. Apparently flashlight powder possesses properties unlike any other artificial light, and warrants an investigation by a physicist, or at least an explanation from one. So far no solution has been offered of the last phenomenon.

CHAPTER VIII

GRAND ISLAND AND ITS HERD OF ALBINO DEER

Doubtless many former readers of "Robinson Crusoe," who later have had occasion to explore remote places on land or sea, retain a special interest in islands, more particularly when such places are in a primeval condition, with a variety of plant and animal life.

Physical barriers serve not only in preserving the purity of a given species, but are often the means of furthering the origin and continuance of new forms; for all organic life has its abnormalities, and some may develop a freakish manifestation into a permanent character, just as others yield gradually to environmental influences, especially where not indigenous to the region.

Lying athwart the entrance of one of the few deep bays on the southern shore of Lake Superior is Grand Island, true to its name in size and beauty. Terminating the westerly end of the famous Pictured Rocks, its giant sandstone cliffs on the north end face the widest portion of the lake, while the nearly land-locked waters on the inner side afford the only natural harbor for many miles (see map, page 114).

CAMPING PLACE OF OJIBWAY INDIANS FOR CENTURIES

This was the camping place of the Ojibway Indians for many centuries, and later a trading post was established, with the interesting life incident thereto.

When tourist travel began, in 1855, on the completion of the first lock at Sault Ste. Marie, this precipitous part of the coast, with its multicolored cliffs and castellated rocks, was seen at close range from the deck of passenger steamers.

Grand Island, with a shoreline of about

Photograph by George Shiras, 3d

NIGHT PICTURE OF A BEAVER PLASTERING HIS HOME WITH MUD

In the fall these animals renewed the covering of mud on their house, not only for comfort, but as a protection against marauding animals, which cannot tear the structure apart when cemented with frozen mud. The picture shows the home of the beaver colony living on the river half-way between the author's camp and Whitefish Lake (see page 197).

40 miles, heavily forested, containing lakes, ponds, and overflowing streams, was always the resort of wild game, the deer in particular being attracted by several natural salt licks near the center of the island.

When a youth, I camped each season with older members of my family on the opposite shores, where so abundant were the trout, deer, wild pigeons, and grouse that only on rare occasions was the island visited.

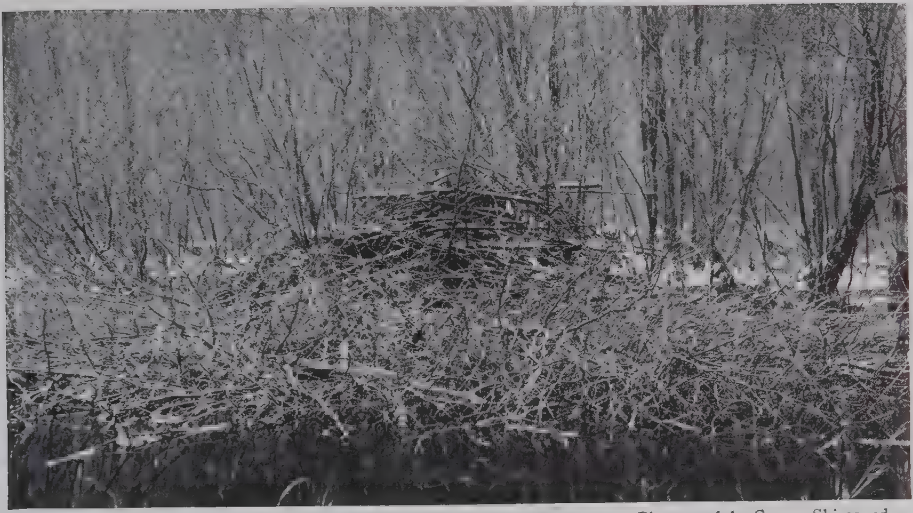
THE ISLAND CONVERTED INTO A GAME PRESERVE

Whenever I ventured into the dark, tangled forests, it seemed that the deer had inherited a greater degree of sagacity than those roaming in comparative safety throughout the unbroken wilderness ashore, due, doubtless, to the peril of island segregation and the inherited fear of the Indian and the fur trader, who made this locality a general rendezvous and hunting ground.

Providentially, in modern times this beautiful island has been saved from the ravages of the axe and the too deadly use of the gun, for a number of years ago it was acquired by a mining and lumber company in the purchase of a larger tract ashore.

Unlike many of the pioneer corporations of the West, this company has always shown a commendable interest in the welfare of the various communities in which it has operated, leaving more than a fair equivalent for that which must be destroyed. It was this spirit which led to an extensive effort to protect the native wild game and to introduce new or foreign species most likely to succeed in a northern country.

Starting with a hundred or more native deer, moose were introduced, together with elk, caribou, black-tail deer,



Photograph by George Shiras, 3d

THE LODGE OF THE RIVER COLONY OF BEAVERS

Showing a great collection of brush and small logs stored in the pool before the house for their winter supply of food (see page 181).

antelope, and several hundred pairs of Scandinavian game birds. For the use of the last-named, thousands of young Scotch firs were successfully planted, to provide their natural winter food. The results of this experiment are interesting and of value for the future.

The Scandinavian birds, principally capercailzie, raised a brood or two, and then fell victims to birds of prey and ground vermin, showing their inadaptability in a country otherwise suitable. Their foes were too numerous and were different from those across the sea.

A HERD OF CARIBOU PLUNGES TO DEATH

The first herd of Newfoundland caribou on a stormy winter night went headlong to their death when pursued by a stray timber-wolf. They leaped from one of the higher wooded cliffs into Lake Superior, under the sheep-like influence that causes these animals to follow a leader and to regard the distance traveled rather than cunning evasion the best means of eluding a pursuing foe. The entire herd perished (see page 144).

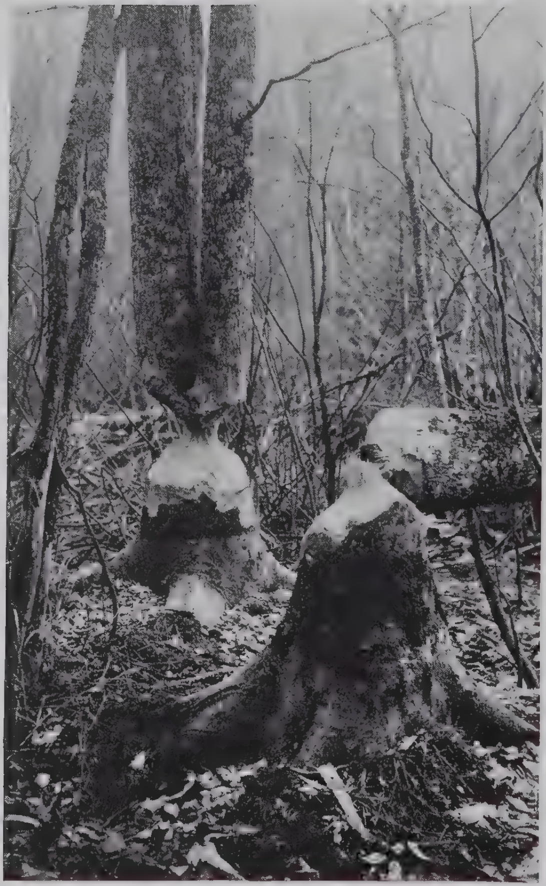
The next importation of caribou developed both species of bot-fly that have always proved such a dreadful and unsightly affliction on their native island; but, unable to suffer and recover, as in their original habitat, these animals also came to a pitiful end.

Again, a wolf crossed on the ice and, getting beneath the game fence confining the animals to the higher ground, soon put an end to the black-tail deer, for they lacked the elusiveness of the white-tail; while the antelope, as rather expected, found the few clearings too small for their roaming habits, and in the deep snows characterizing the upper lake region they gave up the struggle for existence.

THE MOROSE MOOSE VANISHED, TOO

The moose at first thrived and bid fair to succeed in a country adapted to their ways, but on the tremendous increase in the white-tail deer and elk, they refused to travel the runways of their uncongenial rivals. They secreted themselves in a swamp bordering a small lake, where lack of range and food brought on disease, and then these morose and stolid animals vanished, the usual result with moose when too confined—a fact which accounts for the rarity with which they are found in zoölogical parks.

The native white-tail, therefore, won the day against all enforced intruders except the elk. Consequently in these two species we have the ones best adapted for



Photograph by George Shiras, 3d

A TYPICAL SCENE ON WHITEFISH RIVER

From 25 to 30 ash are in different stages of felling or dismemberment, showing that these beavers do not finish one tree before beginning on another. Average time in felling a tree, ten days (see page 197).

the unoccupied ranges throughout the more easterly part of the country.

A closed hunting season on any island, however big, will finally bring most animals face to face with an unavoidable enemy—starvation. Thus it became necessary to supply some food in winter, besides shipping hundreds of deer and surplus elk to parks and game preserves, followed still later by an open season on deer.

THE BEGINNING OF THE ALBINO DEER COLONY

If, however, this long and costly effort to make Grand Island the permanent home of many immigrant species has proved disappointing, an unexpected reward has come, which may eventually prove of greater value than the fulfillment of the original plan, namely, the establishment of a beautiful herd of albino white-tail deer.

A characteristic of the Michigan deer has been the general uniformity in physical appearance; for, though more deer have been killed in Michigan during the past fifty years than the aggregate elsewhere, there are very few freaks in antlers or extremes in weight, while albinism has been equally rare.

Some ten years ago word came that a fine albino buck had been seen frequently on Grand Island coming to a little pond on the easterly side. Taking a camping outfit, a canoe, and my guide, several days and nights were spent watching the pond, and although other deer came during the day or were seen under the jack-light, the white buck did not appear.

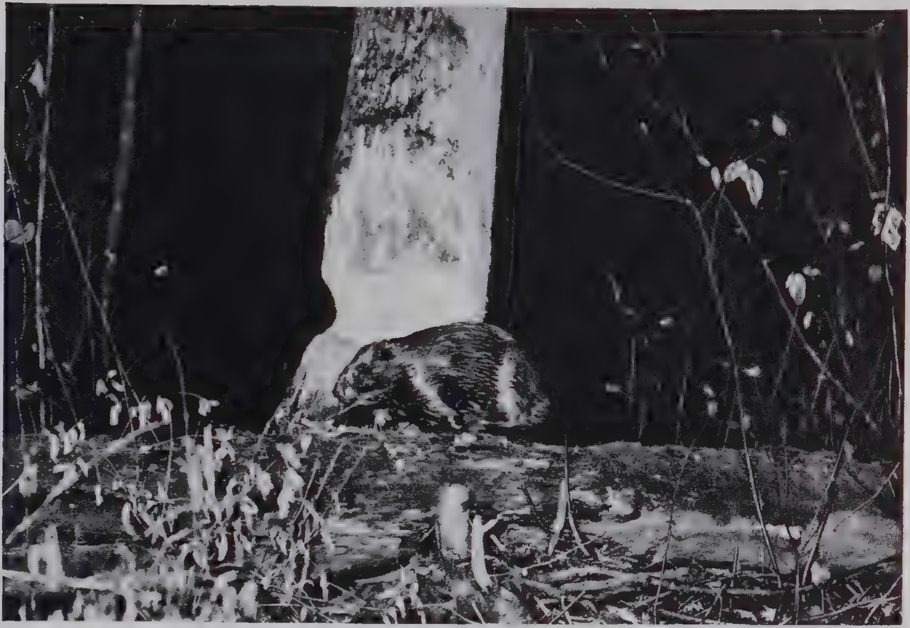
The next year the quest was no more successful, and when I heard that on the opening of the season the white buck had been killed, it was a consolation to know that the body was in the hands of a taxidermist, preparatory to being added to the little museum of the island hotel.

There, later, I took the measurements of the antlers and body, and then, to show what a striking picture such a marbled figure would present with a background of black, the mounted animal was carried one evening to the edge of the forest where once it had roamed and the flashlight fired (see page 148).

Feeling quite confident, from the age of this buck, that white descendants would sometimes be found, a careful watch was maintained throughout the island.

Finally, in the fall of 1915, a good-sized albino buck was noticed loitering about the box traps set for capturing deer to be shipped away. With little effort it was taken.

Upon the removal to temporary quar-



Photograph by George Shiras, 3d

FELLING A TREE UNDER DIFFICULTIES

A beaver cuts through the average tree in a space between 18 and 25 inches above the ground. After cutting on the opposite side this beaver had to finish the job while seated on a log. Note its resemblance to a large muskrat (see page 194).

ters it was found that the buck was suffering from an injury to the spine and was unable to stand.

Recognizing the rarity of such a capture, a regular attendant was placed in charge, and daily it was fed and watered in a reclining position. After a month it recovered sufficiently to walk about, and by spring was in good condition.

DEER WOULD NOT ALLOW KEEPER TO CHANGE HIS COAT

Then an odd thing happened. The faithful caretaker, on approaching the stall one morning, was surprised at the buck showing the greatest terror, plunging about in a way to threaten new injuries. Retiring at once, the question arose as to the cause. Remembering that for the first time he had not worn his winter fur coat, it was replaced, and the buck became docile at once, showing how animals, usually dependent upon scent, may associate an outward garment with identity. Possibly this old fur coat had an odor of its own!

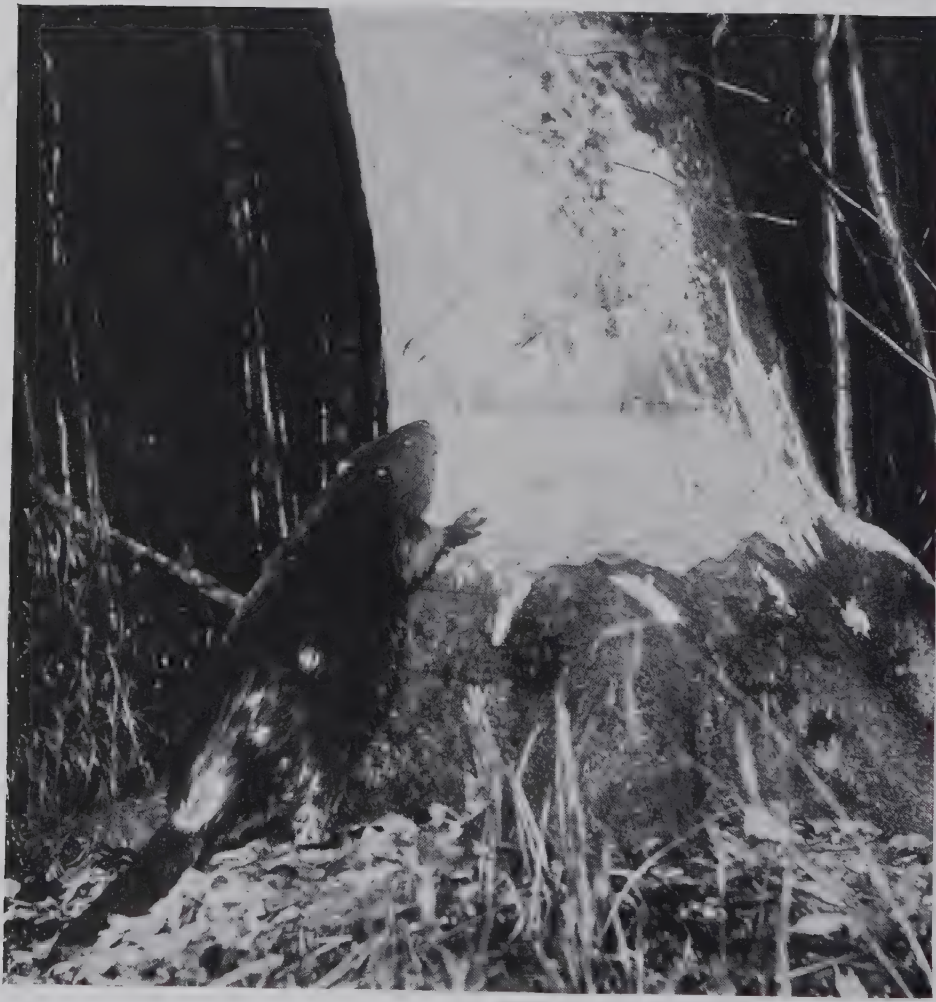
Then the idea of establishing a herd of white deer suggested itself, and with this in view four red does were captured and placed in a good-sized range with the white buck.

A WHITE FAWN FOUND

A few weeks later the project was favored by finding a female white fawn, a day or two old, in a thicket near the island hotel. With careful attention and in the company of another fawn, it grew rapidly.

During the earlier months this fawn had the usual row of white spots on the back and sides, and although there was no difference between these and the body color, they were conspicuous in the same way that satin needlework in a single color may carry a varied pattern (see page 147).

The following year one of the red does in the inclosure bore an albino doe fawn, which lacked, however, the brocaded white spots characterizing the previous one.



Photograph by George Shiras, 3d

CUTTING DOWN A GREAT BLACK ASH: WHITEFISH RIVER

The principal winter food of the beaver on the lake and river is obtained from the hundreds of black ash growing only a few inches above the water level and reached by side channels or sometimes artificial canals. After the smaller ones were cut came others of considerable size. The tree in the picture is 91 inches in circumference, and for three years different beavers have attempted to cut it down, but the flashlight has discouraged the completion of these efforts. The animals store the branches of the tree and eat the bark.

By this time the first fawn had become a yearling and was placed in the same inclosure. Three years ago I learned that there was a yearling albino doe at the State Game Farm, and in a few weeks it was safely transported to Grand Island, where such an addition in new blood has proved of undoubted value.

Then came a telegram in 1919 that the white buck had died suddenly in November, leaving only a buck fawn as the future head of the herd.

In the following spring, however, a posthumous white fawn was born, followed by the favorable news that a large albino doe and two white fawns had been seen on several occasions in a remote part of the island, and these latter can be placed in the inclosure if deemed advisable.

It may be of interest to note that the original buck weighed about 150 pounds and possessed a rather extraordinary set of antlers, spreading 26 inches, with the terminal points much farther apart than any other I have ever seen.

VELVET ON ANTLERS WAS SNOW-WHITE

The velvet on the antlers of both bucks was snow-white, giving them a most statuesque appearance amid the green foliage of the forest.

The eyes of the native albinos are a very light gray-blue, while the doe from the southern portion of the State has the usual red eyeballs. The lack of any pigment in the layers of the retina of this latter individual discloses the red blood-vessels characterizing most albinos, making it very susceptible to a bright light.

The second buck differed from the original one in being somewhat larger, but had only two long spikes of about eighteen inches, the left one slightly forked each season.

The albino deer shed their white summer coat at the usual time, and it is replaced by a heavier and thicker covering, though not quite so long as the winter gray coat of the normal deer. The skin is a light pink, showing plainly through the thin summer coat, in contrast with the almost black epidermis of the other deer. The hoofs and skin of the nostrils are a pearl-gray, instead of black, while the velvet on the growing antlers is white, but when freed from this covering the antlers have the usual brownish-yellow coloring, the only exterior part of the white deer resembling the normal ones.

THE FIRST ATTEMPT TO PERPETUATE ALBINO DEER

Up to the present time, the effort to perpetuate an albinistic strain has been largely confined to white mice and rats, white rabbits, and poultry, for in the larger animals this occasional recession from normal only results in the killing of such conspicuous objects, man and predatory animals being alike responsible. Moreover, when occasionally captured, it rarely happens a mate can be found of similar color.

This white phase is found in all organic life, as, for instance, elk, deer, porcupine (see page 121), beaver, muskrats, squirrels, many wild-fowl, robins, swallows, crows, blackbirds, woodcock, and in frogs, fish, insects, and several forms of plant life, due to the absence of pigment. This deficiency in coloring affects only the outer skin, the hair, or feathers, as well as the retina of the eyes and the hoofs of most quadrupeds. Partial albinism is frequent, and in New Brunswick I saw a number of deer splotched with white of various patterns, giving some of them a strikingly odd appearance.

The writer has been under the impression that the first offspring of albinos were usually white, and on and after the third generation uniformly so, following the rule in silver and black foxes. Several biologists, however, have contended that "albinism being a purely recessive character among mammals, albinos should breed true from the first." That this conclusion is sometimes a mistake was shown a year ago, when one of the white does bore a normally colored fawn, the white buck being the only male in the inclosure.

There are many nature lovers, vitally interested in the efforts of science to produce and perpetuate new variants of existing species, who will be gratified to know that as time goes on specimens of this new and beautiful phase of the white-tail may find representation in other parts of the country. The various members of this original albino colony are shown herein at different ages, in varied attitudes, and in contrasting seasons.

CHAPTER IX

MOOSE ON ST. IGNACE ISLAND

Diagonally opposite Marquette and on the north shore is an interesting and beautiful group of islands, the largest of which, St. Ignace, occupies the entrance to Nipigon Bay, into which flows the most famous of Canadian trout streams.

On a trip west of Port Arthur, in 1916, for the purpose of studying the moose along the international waters between Minnesota and Ontario, I was told that several of the larger islands near the Nipigon contained an incredible number of moose, but as at this point the line of the Canadian Pacific follows the shore, in sight of the islands, the report seemed somewhat doubtful. However, in the

Photograph by George Shiras, 3d

FLASHLIGHT OF A BEAVER TOWING A SAPLING, WHICH IS TO BE ADDED TO ITS STORE OF FOOD FOR WINTER

Unlike the muskrat, with its body well out of the water (see page 199), the beaver swims nearly submerged, with only the head showing (at the right). At a distance it is sometimes hard to tell one from the other when swimming, except by the greater speed and wake of the beaver.

following year it was decided to investigate, for except on Isle Royal, the largest island in the lake, the moose had not been authoritatively reported as island occupants.

It should be stated that for some years after the writer came to Lake Superior moose and white-tail deer were unknown on the north shore, although caribou were abundant, especially in the fall and winter.

MOOSE MIGRATED FROM QUEBEC

About 1885 a steady movement of the moose westerly from Quebec was observed and a slower easterly migration from northern Minnesota. Eventually these animals commingled and took possession of the entire shore, later extending into the interior until they reached the waters flowing into Hudson Bay.

Following the moose came the white-tail deer and many timber-wolves, when the caribou began yielding the possession of centuries.

After the construction of the railroad, extensive lumbering and many forest fires changed the face of the country, large clearings and a mixed vegetation succeeding dense evergreen forests, and to this change may be principally attributed the influx of new animals and birds.

Most of this land being unsuitable for settlement insures a permanent and widely extended range for many of the big-game animals suffering eviction in districts valuable for mining or agriculture.

In September, 1917, our party arrived at Rossport, a little fishing village between the railroad and a bay opposite Simpsons Island, next in size to St. Ignace. Here provisions and canoes were obtained, and a few hours later the little tug was on its way, the party alert to detect the first island moose, the pilot having given assurance that before reaching the camp site several would be seen.

MOOSE FOUND FEEDING IN THE LAKE

When passing through the broad channel separating the two larger islands, three moose were noted well out in the shallow water at the end of a long bay, the first time in my experience that any such game animal was found feeding in the waters of Lake Superior, which, by reason of its depth and temperature, contains little aquatic vegetation.

Along the winding shores was noted a great variety of second-growth trees particularly suitable as browsing material for the moose, such as poplar, cherry,

Photograph by George Shiras, 3d

PARENT AND YOUNG BEAVER EATING THE BARK OF A POPLAR LOG USED BY THE AUTHOR AS BAIT

Only once did more than one beaver appear on the negative. Here a small poplar log attracted the mother beaver and her youthful offspring.

birch, soft maple, mountain ash, and balsam, while interspersed the dense forests of spruce offered a safe retreat from the hunter and an excellent shelter in the winter, being the only tree never eaten by moose or deer in this region.

WATCHING FOR MOOSE AT THE SALT LICKS

However, the apparent abundance of arboreal food was misleading, for it was now seen from the boat that all the lower limbs of the trees referred to had been eaten or destroyed by the animals for some ten feet above the ground, accounting for the moose just seen in a shallow bay, where the temperature permitted an unusual growth of water plants (see page 163).

Unlike Grand Island, with its precipitous cliffs to the north, most of the exposed shore of St. Ignace Island was low, with many bays separated by narrow, rocky points offering suitable camping places, where reefs and shallow waters seemed favorable for the best of trout fishing, while inland were high, rounded hills approaching an altitude of fifteen hundred feet, besides several rocky ridges dividing the island into many basins filled with the purest water, ranging from ponds of an acre to a lake four miles long, totaling nearly fifty on an island eight miles by five in size.

The tents were pitched on a level bank in a well-sheltered grove, at the edge of which flowed a fine trout stream leading from the largest of the interior lakes (see page 157).

Although facing the widest portion of Lake Superior, it was our intention to spend most of the time looking for moose in near-by ponds, as well as watching for them at several natural salt licks in a deep valley behind the camp.

BIG MOOSE HERD LIVING ON WATER PLANTS

These licks were discovered by two members of the party fifteen years before, when a yacht in which they were cruising ran on a reef. While awaiting the assistance of a tug the island was visited, where numerous caribou tracks about muddy pools indicated the presence of salt springs. It was due to this rather ancient record that we expected to find the moose as successors to the caribou at these resorts, which calculation proved correct. What the camera captured is best told by some of the illustrations accompanying this article.

In a week one hundred and fifty moose were seen, all apparently depending upon water plants for support, the numerous ponds and lakes yielding a sufficiency, though often the animals were forced to feed in water well over their backs, as they dived out of sight in search of food (see page 162).

Only on the face of inaccessible cliffs was the vegetation undisturbed, and just how these animals survived the long winter, when the waters were closed, was a problem, though many of them may have crossed to the main shore and returned in the spring. In a patch of spruce were discovered two large pairs of interlocked moose antlers, where these animals, in the fierce rivalry of the mating season, had gone down in mutual defeat forever (see page 161).

At the time of our visit no one was living on any of these islands, but nearby inhabitants supplied themselves with moose meat regardless of the law, justifying it on account of war conditions. At a salt spring several hundred yards back of the camp I located the first blind, where it was disturbing to see a four-year-old bull moose lying dead within thirty yards, killed but a few hours before and abandoned by reason of our proximity. Here, festering in the sun, it soon drove away any of its surviving associates (see page 159).

MOOSE DIG A BASIN OF CLAY AT SALT SPRING

Several days later another blind was placed opposite one of the best natural licks I have ever seen, located a mile up the stream from the first. Here the moose during many years had dug out a large clay basin, into which trickled a salt spring from the adjoining bank, the mixture resembling liquid mortar.

Every time we passed the place one or two moose would leave hurriedly, but a trial in the daytime showed that the scent circled toward the lick, covering every approaching runway; so a flashlight and camera were set up, and on the night following a large cow moose took its own picture at a distance of fifteen feet. The analysis of this salt lick is given in the text beneath the picture (see page 164).

On several islands adjoining, the moose were numerous and tracks proved the presence of a considerable number of caribou. All these animals visited licks similar to those on St. Ignace. On the opening of the hunting season, the same fall, one party of five from Port Arthur killed their limit of five big bull moose on the first day of the hunt, the antlers ranging in spread from forty-eight to fifty-four inches. The question uppermost in the author's mind is whether any of the fine bulls pictured in this chapter furnished some of these trophies.

Just as the south shore has been almost depleted of its trout by taking them at the mouths of all the spawning streams during their fall migration, similar conditions now prevail on the north shore, while a worse habit of running the gill-nets to the beach, ostensibly set for lake trout and whitefish, results in taking all the speckled trout exceeding two pounds in weight, and soon only the Nipigon, always under rigid government supervision, will remain.

CHAPTER X

WILD LIFE IN AND ABOUT THE CAMP GARDEN, WHITEFISH LAKE

In a previous issue of this Magazine* reference was made to the large number of birds and animals visiting the clearing and log cabins of a wilderness camp; for such a place is often an oasis in a dense and monotonous forest, where sunshine, wild berries and seeds, shrubbery and ground vegetation, insects, and small rodents offer food or a trysting place to many a creature outlawed by man.

Mention, too, was made of smaller and less timid animals which came at night to the gardens and poultry yards of many a rural home, especially when there are thickets, swamps, or rocky ravines in the vicinity. The tenacity with which these refuges are occupied by certain wild animals in the midst of encroaching civilization is an interesting study in resourcefulness and adaptability, wherein reason plays a part quite as important as that of instinct.

For nearly thirty years my camp was occupied only in the fishing and hunting season, followed by intermittent or long

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* See "Wild Animals That Took Their Pictures by Day and by Night," July, 1913.

Photograph from George Shiras, 3d

A BEAVER EYEING THE OUTFIT WITH SUSPICION

Sometimes the thread, as above, runs to the base of the tree, showing the beaver making a preliminary circle before starting to work; in other cases the thread is attached just below the cutting, picturing the animal erect (see page 178).

periods of disuse. On returning, there was varied evidence of of many woodland visitors, for here, in a sunny spot, would be the daily dusting place of the grouse; everywhere were the hoofprints of deer and occasionally the dog-like tracks of a skulking wolf, unafraid of a hunter's cabin when a fresh trail of a deer gave assurance of a long-absent owner.

There were doorsills and pork barrels gnawed by the saline-seeking porcupine; the broken branches of a mountain ash where Bruin leisurely pulled down red clusters of frost-sweetened berries; the tender saplings girdled by a varying hare; clover and dandelions cropped close by bulky woodchucks; the pungent odor of a skunk beneath the cabin floor, and tracks of the great blue heron, mink, muskrat, and the beaver on the sand-bars of the creek flowing through the camp lot.

STUDIES IN ANIMAL PSYCHOLOGY

Perhaps the first night there would be a chorus of indignant owls within the glare of the camp-fire or the startled snort of an approaching deer. Then all would change. For the circling smoke, the heavy blows of the axe upon the hardwood logs, human voices, and the telltale scent gave distant warning of the enemy's return.

Except for the twittering of the chipmunk, the tattoo of the woodpeckers, and the flight of cedar birds and bluejays across the clearing, or the scamperings of the white-footed mice upon the cabin floor, all the more timid birds and animals would disappear.

The difference between the time when there was neither a habitation nor a railroad within twenty miles (see page 124) and when a more accessible camp was enlarged and a caretaker continuously in charge affords one of the most interesting chapters in animal psychology within the writer's experience.

It might well be supposed the eviction of forest visitors was final when the place was occupied by day and night, with all the noise and bustle of a woodland home, for the chorus of barnyard fowls, the neighing of horses, the lowing and the tinkling bells of browsing cattle, the chug of an engine filling the garden tank, the circling smoke, and the glittering lights seen afar each night gave ample notice to every living thing that man had invaded their domain and intended to abide therein throughout the year.

THE CAMP BECOMES A RENDEZVOUS FOR FOREST FOLK

But just the contrary happened. The deer soon found that their ancient enemy preferred a camera to the gun, and, freed from the terror of prowling wolves, took

Photograph by George Shiras, 3d

A BEAVER (AT LEFT) FILLING IN THE SLUICEWAY OF THE OLD LOGGING DAM (SEE PAGE 198)

After the sluiceway had been two-thirds filled with water-soaked logs and sticks, it was completed by intertwining bushes and water-grasses, with a stone or log to hold them down.

possession of swamps and near-by thickets. The grouse knew the fox and lynx were equally cautious, and nested contentedly at the edge of the clearing.

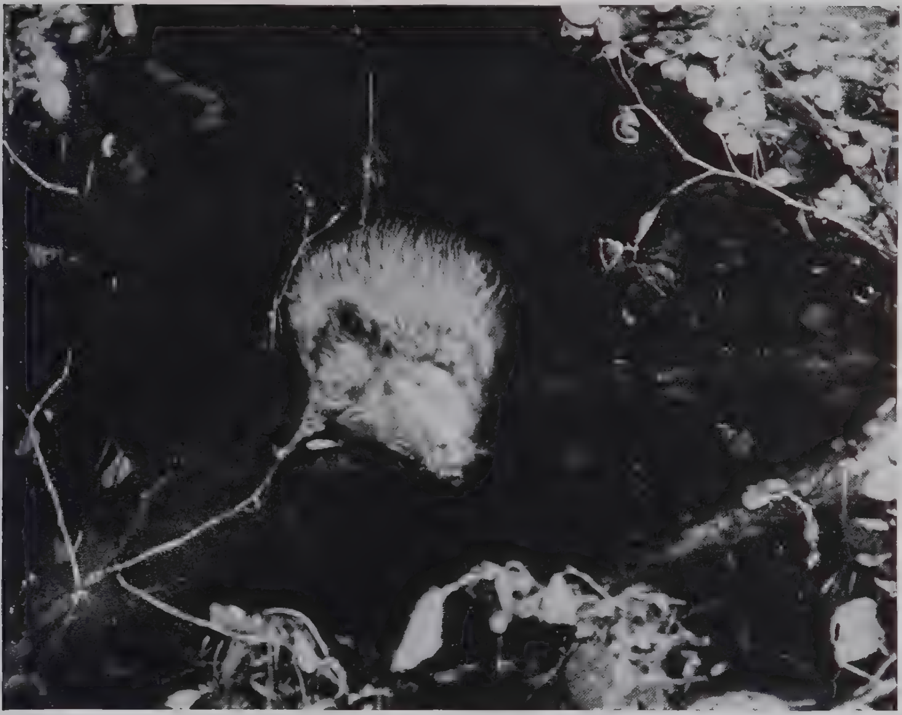
Robins, safe from hawks and owls, built numerous nests in the scattered balsam, finding angleworms and berries for their clamorous broods. The night-loving hare nibbled on the clover beneath the midday sun (see page 168); the muskrats had trails straight from the creek to the nearest carrot patch; porcupines chiseled the tender bark of many a sapling; once a beaver gnawed a half-grown ash by the boat-house and only retreated when the flashlight recorded a midnight visit (see page 167).

Raccoons knew when the corn was tender, and again the flashlight saved the crop; skunks dug holes beneath the stable floor and now and then picked up a belated fowl; a mink, grown tired of a diet of fish, took heavy toll of the snow-white ducks in the swimming-pool (see page 166); chipmunks found the little potatoes just the things for carrying off; cherry birds gladly changed from the wild to domestic fruit (see page 123), and all day long woodpeckers, nuthatches, catbirds, and jays picked at the suet hung conveniently near.

Humming-birds and butterflies flitted among the flowers, beneath which sat little green frogs sure of a meal (see page 174); the blue heron stalked at the edge of the stream (see page 169), and none ever had reason to regret a camp wedged in the mighty forest, except those seeking the lives of harmless creatures.

THE DEER AS MIDNIGHT VISITORS

The most interesting as well as the most destructive visitors were the deer, for as the gradually enlarging garden



Photograph by George Shiras, 3d

BEAVER WORKING ON SUBSTRUCTURE OF THE DAM THREE FEET BELOW THE SURFACE

This scene represents one of the many beavers that, for the past six years, have endeavored to fill in the sluiceway of the lumber dam above the author's Whitefish Lake camp (see page 198). This beaver fired the flashlight when he was several feet below the surface. Body takes white, oil on hair reflecting light. Note the hair separated in strands by the current.

offered a greater variety of vegetables and small fruits, the temptation proved irresistible.

When the garden patch was a simple one, and unguarded before the hunting season, the bucks were formerly active in these forays; but few came later, the gallantry of the mating season sometimes inducing an antlered escort to jump the fence over which had already gone his less timorous partner.

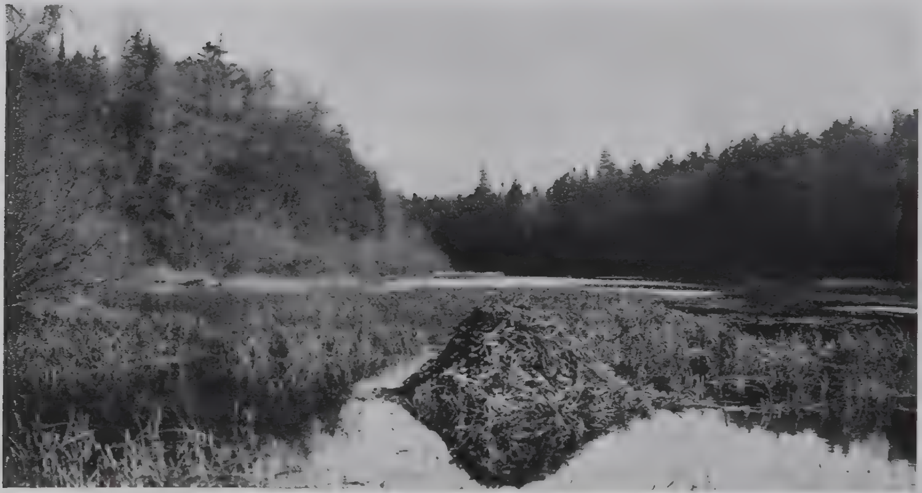
Does, fawns, and yearlings, totaling some seasons more than a dozen, each night or so registered their presence and respective ages by the clear-cut hoofprints in the garden soil. Rarely did one come before midnight and seldom were any seen in the vicinity during the day.

In the past decade a record has been kept of the vegetables and fruits most preferred, with a notation when there was a marked departure any season by groups or individuals.

RASPBERRY BUSHES FIRST VISITED BY DEER

Not until the fawns were free to follow their mothers and the garden offered the first of the ripening crops would there be a visitor. On or about the middle of July the wild raspberry bushes close by the fence showed a clipping of the newer growth, followed by a nibbling on the tender bark of border fruit trees. A few days later, when the darkened windows gave assurance that the occupants had retired, the vegetable patches close by the cabins were visited.

In the order of choice, and somewhat determined by the rate of growth, came the carrot and beet tops, lettuce, and new shoots of domestic raspberries, white clover, peas, Brussels sprouts, and white



Photograph by George Shiras, 3d

A CONVENTIONAL HOME OF THE MUSKRAT

A type of house built by all muskrats in shallow, marshy waters throughout the country. This presents a view of the slough much frequented by deer (see page 127).

and red cabbage, the last mentioned, by reason of its sweetness, preferred above all else.

None ever touched the leaves or products of the potato plant, tomatoes, squash, rhubarb, corn, cucumbers, asparagus, onions, or parsnips, and the escape of the latter was inexplicable. Some seasons their attention was almost entirely devoted to the strawberry plants, and then the next year not a leaf or a tender runner would be touched.

FLASHLIGHT TEMPORARILY DETERS ANTLERED MARAUDERS

In the endeavor to save the cabbages, they were always planted within a few feet of the caretaker's bedroom; but often in the morning a great gaping hole in the center of a head showed what was considered the choicest morsel and willingness to take a chance.

Partly to save the crops and, in my own case, more to record the presence of the most cunning of our antlered animals, the flashlight and cameras were put in different parts of the garden, with a cabin or some camp shelter as a background when possible. More than fifty such pictures have been taken, a few of which accompany this article (see pp. 170-173). The heavy report and dazzling glare terrified each marauder for a week or two, and then, led by hungry and less timid fawns, they returned again to the feast, where on moonlight nights their shadowy forms might be seen moving noiselessly from place to place.

MUSKRATS MAKE A FORAY ON PARSNIPS

As another means of saving a portion of the crops intended for winter use, each on reaching maturity was placed in the root-house, except on one occasion the parsnips, which, never having been molested, were left in the ground, well covered with four or five feet of snow. It was the intention to dig them out early in the spring, when they would be in a better and sweeter condition than if placed in the root-house.

In the spring, as the deep snow began melting, a hole was dug down to the soil for a first meal on the parsnips, when a tunnel, with branches leading 200 feet to the water, made by muskrats, was found and not a vegetable remained! This showed very plainly the habits of these animals in venturing far from the water-courses and beneath the deep snows in search of green food untouched by frosts or zero weather.

SUMMER RESIDENT BIRDS ABOUT CAMP

In addition to the birds already mentioned within the camp inclosure and the

Photograph by George Shiras, 3d

IMITATING THE BEAVER HOUSE

A large muskrat house constructed entirely of sticks and mud, closely resembling in shape and material that of the beaver; south end of Whitefish Lake.

vicinity, a large number have been omitted which may now be noted in order to complete the record. No migrant passing to the north or returning in the fall is included, but only those found nesting or in company with young too immature to have crossed Lake Superior. Among the birds are the following:

The hooded merganser, mallard, black-duck, wood-duck, bittern, great blue heron, solitary sandpiper, spotted sandpiper, and killdeer; the hawks include Cooper's, the red-tailed, broad-winged, and the sparrow-hawk, and the owls are the barred and the western horned, both winter residents. Among the other birds are the black-billed cuckoo, belted kingfisher, hairy and downy woodpeckers, yellow-bellied sapsucker, northern pileated woodpecker, flicker, nighthawk, chimney swift, ruby-throated humming-bird, kingbird, phœbe, olive-sided flycatcher, wood pewee, alder flycatcher, least flycatcher, cowbird, meadow lark, bronzed grackle, purple finch, goldfinch; and the sparrows are the vesper, white-throated, chipping, field, song, and the Lincoln sparrow (doubtful), together with the slate-colored junco, the rose-breasted grosbeak, barn swallow, tree swallow, cedar waxwing (see page 123); and the warblers are the black and white, black-throated blue, myrtle, chestnut-sided, Blackburnian, and black-throated green warbler, the list concluding with the oven-bird, Grinnell's water thrush, house wren, white-breasted nuthatch, chickadee, olive-backed thrush, and bluebird.*

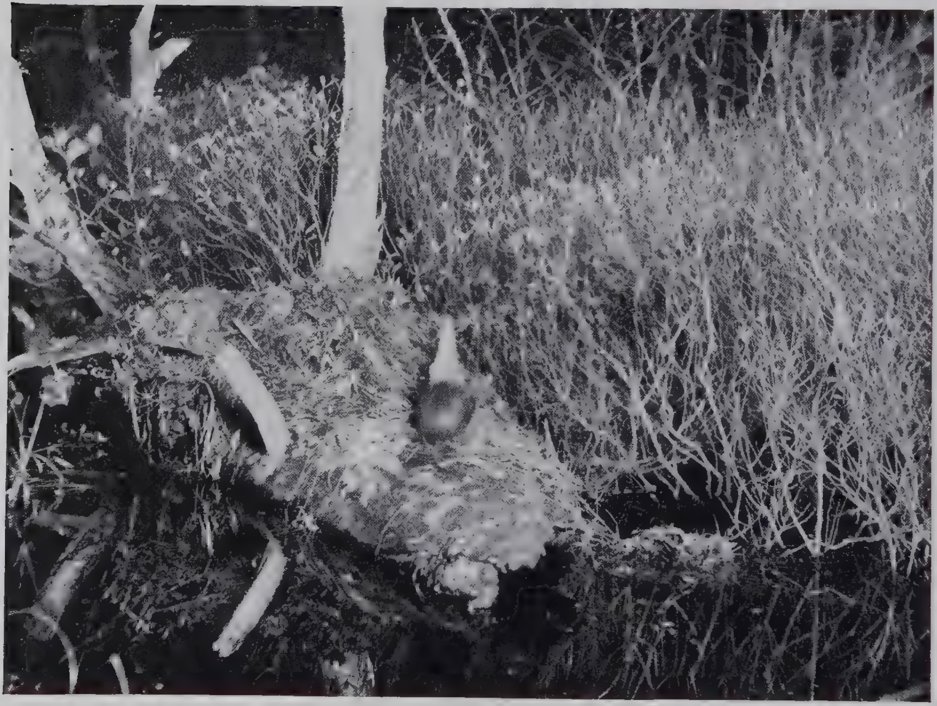
CHAPTER XI

THE BEAVER AND THE MUSKRAT: A COMPARISON

Conspicuous among the few North American animals which have no representative in the Old World is the muskrat, its fossil remains being found in Pleistocene deposits in many parts of the United States, while the beaver belongs to a more remote time, its ancestors going back to the Tertiary period, when they were associated with the mastodons and mammoths throughout portions of Europe and Asia.

Considering the early importance of the beaver as a source of fur and food, and the respect shown its skill in constructing dams and houses, in cutting

* This list was verified by Mr. Norman Wood, field naturalist of the Michigan University Museum, who spent the spring and summer of 1918 at the author's camp.



Photograph by George Shiras, 3d

MUSKRAT HOUSE WITH A CORRIDOR

For five years, at least, a pair of muskrats have used this hollow log as an entrance to their winter home, which is rebuilt each fall on top of the log. A hole in the upper part provides an entrance (see also illustration on opposite page).

and storing its winter food, or wariness in avoiding the multitude of methods designed for its undoing, it is not strange that this animal figured in the tribal ceremonies of various Indian tribes and was exalted above other animals.

Both of these aquatic fur-bearers belong to the order of rodents, the beaver being the sole representative in the family *Castoridæ,* while the muskrat, once associated as a genus in the same family by Linnæus and others, has been demoted by later scientists and assigned to the rat and mouse family, the *Muridæ,* consisting of more than a thousand species and variants, widely distributed small animals, including many useless and destructive "varmints."

THE CINDERELLA AMONG FUR-BEARERS

To the properly descriptive prefix "musk" was appended the derogatory term "rat," making it a Cinderella among the fur-bearers and an outcast for many years in fashionable circles. With the gradual recognition of the high value of its fur, mostly under fictitious trade names, its caste has improved very greatly of late. Without entering into a discussion concerning the structural differences between the beaver and the muskrat, it is interesting to note their general resemblances in appearance and habits.

These animals are similar in shape and color, in the double coat of hair, webbed feet, flat, scaly tails, in having peculiar gland secretions and other anatomical resemblances. In habits they are homogeneous, being aquatic, nocturnal, monogamous, living in houses or burrows within the banks, each constructed and occupied in much the same way, often as harmonious cotenants, while their extensive range is the same in North America.

There is a marked similarity in the food habits of these animals. Very many

Photograph by George Shiras, 3d

A COMPLETED MUSKRAT HOUSE (SEE ALSO ILLUSTRATION ON OPPOSITE PAGE)

This flashlight shows the pair of muskrats putting the finishing touches to their home.

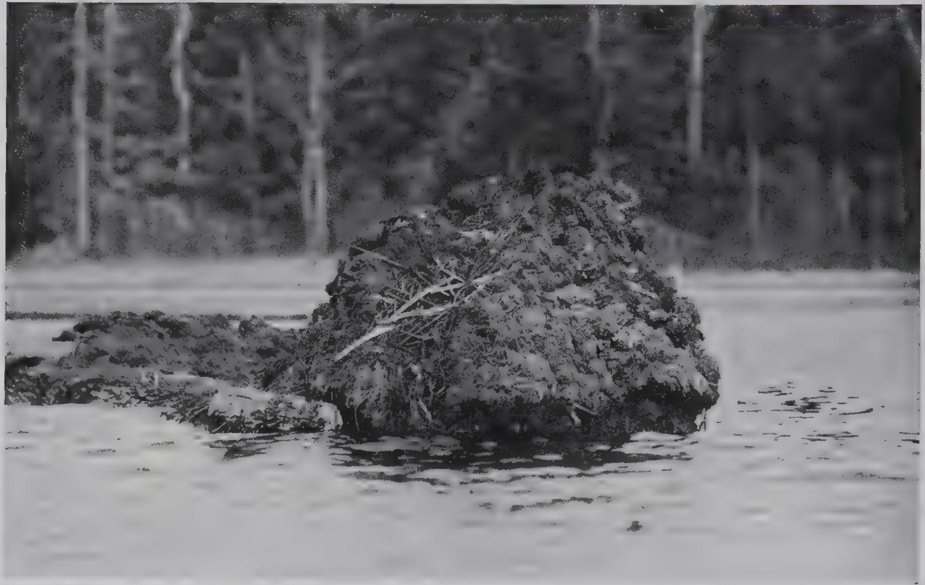
suppose that the beaver primarily depends on bark, and that such soft vegetation as it feeds upon is incidental and irregular. This is an error, for the beaver in its extensive ranges relies upon bark only during the months when other food cannot be easily obtained or stored.

By adaptation to the seasonal food supply, the beaver resorts to the more perishable aquatic growths from May to October, and to the many varieties of land plants, bushes, and vines, thereby conserving the arboreal supply for a time when the deciduous plants yield to the frosts or gradually chilling waters. In higher altitudes, where spring or glacial streams are often too cold for vegetation, the beaver depends upon bank willows, weeds, and the other small growths, though occasionally the bark of poplars or birch is eaten at the base, the tree seldom being cut before fall.

Prior to 1700 the beaver was seldom molested by the Indians of the upper lakes; for, aside from decorative purposes, they preferred larger skins for domestic use.

The early explorers found the usual meadows and alder-covered flats, where the original forests had been killed by the flooding caused by beaver dams; but, as the watercourses were fringed almost entirely with conifers, the lake region in the beginning was not a particularly good beaver country. When the aquatic plants, willows, alders, and black ash, constituting their principal diet, became exhausted, the animals migrated elsewhere, and thus these cycles of occupation and abandonment were regulated entirely by the question of food.

On the arrival of the trappers it did not take long to reduce these numerous but scattered colonies, and for a hundred



Photograph by George Shiras, 3d

MUSKRATS LIKE HOUSE-BOATS

A cedar raft built for the muskrats to use as a float for their winter home. Anchored in the slough at the south end of Whitefish Lake and now in use three years (see page 196).

and fifty years there was a succession of good seasons, followed by a relapse.

A NOTEWORTHY STUDY OF THE BEAVER

When the writer first came to Lake Superior not one stream in a dozen showed any recent signs of beaver, most of the animals being found at the headwaters of the streams and on little lakes well inland, where the Ojibways never lived and the white trapper sometimes overlooked them.

In 1867, three years before my arrival, there appeared in print a monograph on "The American Beaver and His Works," by L. H. Morgan, the most original and valuable biography ever written about this animal, and still regarded as a classic in zoölogic literature. Mr. Morgan resided in Marquette County for a number of years, associated in the building of railroads and furnaces. On his many trips into the woods he always employed Jack La Pete as his principal guide, and from the latter I learned much about this indefatigable investigator.

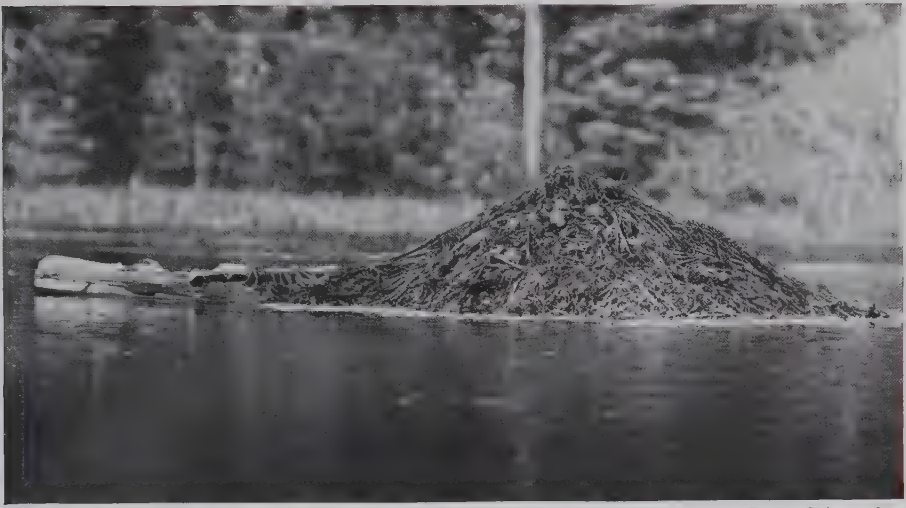
Mr. Morgan's collections of skulls and bones led us to nickname him "the fossil"; for, boy-like, we thought such relics savored of mental antiquity. It is now a pleasure to join in the public commemoration of this remarkable production and to be able to note the great changes taking place in the same localities he visited.

About 1885 the last beaver disappeared from the waters about camp, and for twenty years thereafter none was seen. Finally, a long closed season saved the remnant in upper Michigan.

Six years ago I found fresh cuttings and later located a beaver burrow deep within a bank at the south end of the lake. The next year in enlarging the chamber it broke through the surface soil, which was then covered with a mass of sticks.

HARD TIMES IN THE BEAVER WORLD

The same fall the eviction of the two-year-old beaver led to the establishment of a colony on the river not far above camp, where a large house was built of sticks and covered with mud (see page 180). This new home, however, was not finished until the middle of November, when the ice prevented the collection of the winter supply of food.



Photograph by George Shiras, 3d

BEYOND REACH OF WOLF, FOX, OR LYNX

A raft similar to that shown on the opposite page, anchored in ten feet of water, where it swings freely with the wind. These floating foundations permit the building of the superstructure a month earlier than where the animals are delayed through the fluctuating levels of the lake each fall. One raft house is built of moss, the other reeds.

The next year their plight was disclosed by the stumps of half a dozen black ash cut five feet above the ground, indicating the snow level at the time of their desperate harvesting. In the spring the melting of ice released and brought to the surface a large number of yellow lily roots, some of them six feet long, from which the tender shoots and the outer covering of the roots had been removed, indicating the beaver had passed beneath the ice-covered stream to the lake in search of food at a time when zero weather may have prevented forays above ground.

No lumbering having been done on the river and lake except the removal of a few large pines, there was an absence of all second growth, the beaver depending largely upon the long stretch of black ash bordering the river and parts of the lake. After the smaller trees had been cut, the remainder, varying from 40 to 90 inches in circumference, came next.

When the river colony was estimated to contain eight animals, there were two seasons, 1918 and 1919, during which from 25 to 30 trees were in the process of felling at the same time, showing that few, if any, of these animals continuously confined their efforts to a single tree until the work was finished. On an average it took from ten to fifteen days before large trees were felled, by reason of this intermittent cutting.

BEAVERS WERE NEVER SEEN IN DAYTIME

The beavers on the river were never seen in the daytime, for the narrow and shallow waters deterred such excursions, but on the lake it was not unusual to see some swimming about late in the afternoon.

It was some years before this, in October, 1912, and on a stream west of Marquette, I got a flashlight of a beaver repairing a dam which had been broken during the afternoon, for the purpose of getting a night picture as the animal attempted its repair (see page 177).

But those about camp had no dams, or at least were not permitted to block the river with one, and consequently the idea of taking a flashlight picture while a tree was being cut seemed to offer the best chance. For three weeks an outfit faced a half-cut tree without result. So, on departing for the East, I told John to leave the camera out a few days longer.

A night or two later a loud explosion was heard up the stream and the undeveloped plates were sent me with the hope

Photograph by George Shiras, 3d

FIRST COME FIRST SERVED

Here a pulling string connected with a flashlight and camera was baited with carrots and fish, for either muskrats or mink. The muskrat fired the flash first, and later a mink removed the fish, as shown by its tracks in the snow the next morning.

that a beaver would be found at work. This proved to be the case, giving much encouragement for continuation of the efforts the next season (see page 178).

While luck varied during the ensuing years, it was not long before I had a dozen or more pictures showing some of the animals erect, busy gnawing away, and others walking about at the base of a tree (see page 183).

PHOTOGRAPH SOLVES A PROBLEM

These photographs made possible the determination of the much-mooted question whether more than one beaver assists in the cutting of a tree. In not a single instance was more than one beaver shown at work or in the vicinity of the tree, nor was that tree touched again during the same season.

From the very beginning, the river colony tried every fall to block the sluiceway in an old lumber dam several hundred yards above camp by filling it with water-soaked logs and branches, the purpose being to flood the river bottom when cutting down the tree.

Each fall and to the present time it has been a case of "pull out in the morning and fill in at night." This effort to utilize the dam was a very practical conception, only it conflicted with prior rights at camp by preventing access to the lake (p. 190).

This almost daily removal of a great mass of sticks and brush caused John to figure on some way of discouraging their nightly activity, so a lighted lantern was placed in the middle of the dam, with the expectation that this would end their endeavors. The first night the plan was a success, but on the following one the animals were busier than ever. Then the lantern was lowered to the surface of the water, and they paid no attention to it whatever.

WATCHING THE BEAVER AT WORK AT NIGHT

Taking advantage of this situation, we visited the place at night to witness the beaver at work. Such a close view and under a strong light revealed perfectly their methods of construction; so a night later the flashlight and camera took our

Photograph by George Shiras, 3d

A MUSKRAT HEADED FOR THE CARROT PATCH (SEE PAGE 192)

The muskrat differs from the beaver by swimming with its body well above the surface. Contrast this photograph with that of the beaver on page 186.

place, in order that the scenes visible to a few might be put in a permanent and more available form (see page 177).

In 1919, after the beaver became abundant in a number of upper Michigan counties, the season was opened, resulting in all the trappers concentrating in these localities and in the rapid decline of the new-comers. A much better policy would have been the trapping alive any surplus and the distribution in those districts containing hundreds of thousands of acres of worthless second growths along the banks of streams and lakes where the beaver had not yet come.

Such a system, in a few years, would enlarge the beaver population to a point probably never reached in the region before; for the greatly increased food supply and well-balanced regulations in trapping would regulate and perpetuate a contribution of nature such as man never attempted before on such a suitable range.

The muskrat is much more versatile in the variety of its retreats than the beaver, possibly because of its smaller size. Often it takes possession of the overhanging and lower portions of a beaver-house, living there in peace with the larger landlord, or it may use the wing of any old lumber dam for an all-year home.

THE ABODES OF THE MUSKRAT ON WHITEFISH LAKE

The muskrats of Whitefish Lake have an unusual number of domiciles; for, in addition to those already mentioned, they resort to hollow logs with an entrance under water, or tunnel beneath a fallen trunk extending beyond the bank, this latter retreat being, I believe, a very common one.

One morning, on a Wyoming lake, I found a pair of muskrats asleep in a newly made nest of grass beneath a flat-bottom rowboat, where the bow extended above the water, and two succeeding nights the same thing happened. Such a home is easily constructed, besides being warm and secure.

The logs along the shore are often the

Photograph by George Shiras, 3d

MUCH ENGROSSED

Daylight picture of a muskrat on the edge of new ice, feeding upon moss taken from the bottom of the lake.

foundation of the superstructure, and in one instance the animal entered the hollow end and then, through a hole in the top of the log, reached the house (see page 194).

A MUSKRAT HOME ON A RAFT

Probably the strangest of all these homes are depicted on pages 196 and 197, where the animals used large rafts anchored in the lake and put there for that purpose by the writer.

Sometimes the house material used by the beaver and muskrat is completely reversed, for when reeds and moss are scarce the muskrat occasionally builds a house out of sticks and mud (see page 193), while the beaver, in a prairie country, has been known to construct its lodge entirely of aquatic vegetation, resembling that of the muskrat except for its size.

Both these animals are particular in having one or more entrances to their homes beneath the water, and when the water recedes the canals are deepened, so as to maintain subsurface approaches.

The muskrats of Whitefish Lake have a habit of building small houses out of moss on the ice-covered lake, using them as resting and feeding places when seeking water plants in the winter.

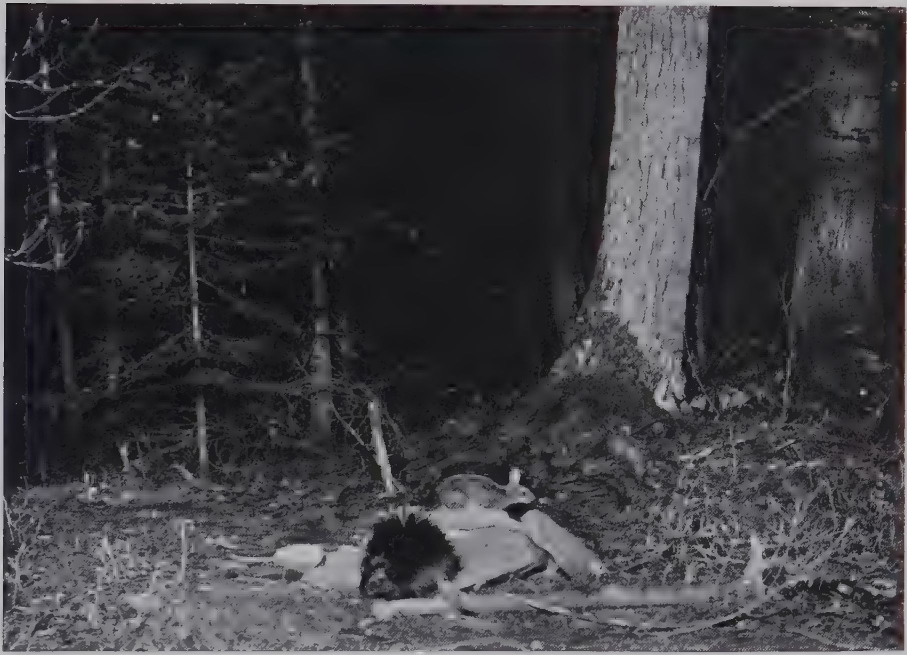
In many parts of its range the muskrat is supposed to raise from three to four litters a year. Along a great portion of the southern shore of Lake Superior I have never seen any evidence of more than one set of young a year. In this section occurs one of the deepest snowfalls of the country, and this unusual condition doubtless affects the muskrat.

About Whitefish Lake the waters remain cold and high until after the middle of May, when vegetation responds rapidly to the many hours of sunlight. The first young are seen the middle of July, and from that time on until the early frost or the coming of the ice I have never felt sure of having seen the young of a second litter.

THE EDIBILITY OF THE MUSKRAT

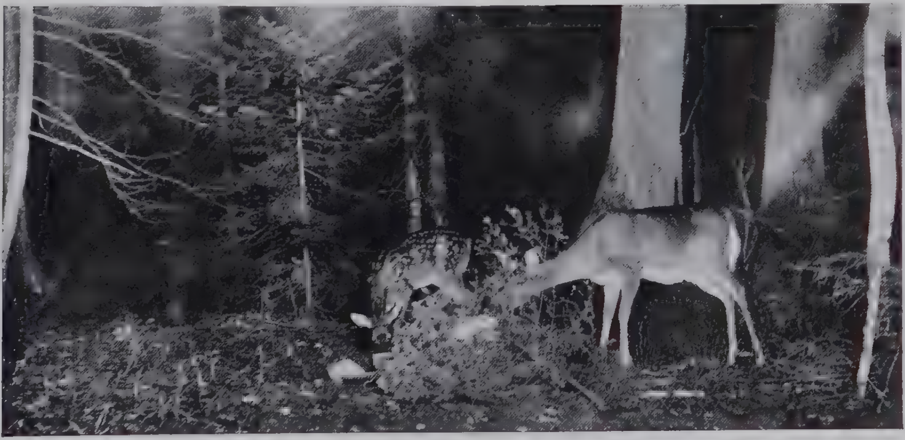
In recent years the flesh of the muskrat is becoming more and more esteemed. Its unfortunate surname—rat—has done more to excite a prejudice against its use than all the other causes combined, especially among the feminine members of the family.

Its meat is dark red in color, fine-grained and tender. According to the Biological Survey, any unfavorable opinion as to its flavor arises, probably, from



PORCUPINE AND VARYING HARE TAKING THEIR OWN PICTURES AT NIGHT

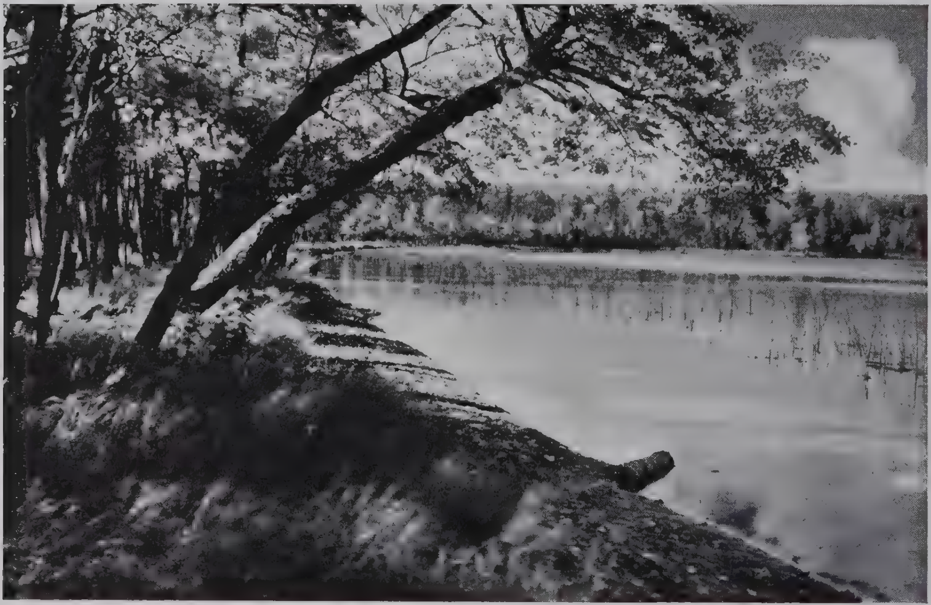
Rock-salt was placed between stones, to attract the deer. When the flash was fired, the developed plate showed in front a salt-loving porcupine, while in the rear is a varying hare, of similar taste, in the act of running into a string attached to the stake behind.



Photographs by George Shiras, 3d

DIFFERENT VISITORS ON THE FOLLOWING NIGHT: WHITEFISH LAKE

To prevent small animals firing the flash, as shown in the picture at the top of the page, a balsam top was placed over the salt, raising the string several feet, where it was not so noticeable in the mass of branches. Such contrasting and unsuspected scenes illustrate the fascinations of the automatic flashlight



Photograph by George Shiras, 3d

THE BANK ON THE LEFT, COVERED WITH SECOND-GROWTH TREES, IS AN ANCIENT BEAVER DAM 1,500 FEET LONG, PROBABLY 400 YEARS OLD, AND FORMING THE LAKE ORIGINALLY

The picture shows the western end of Echo Lake, which occupies a mile in the center of Grand Island. It is largely frequented by deer and elk.

the lack of skill in cooking or from carelessness in skinning the animal. It can be fried, roasted, or stewed, only having a slightly gamy flavor, which can be removed by soaking the meat over night in salt water.

I have found it comparable to tender chicken. For years it has been served, highly seasoned and flavored, under the name of "Maryland terrapin," without exciting any suspicion on the part of connoisseurs, who pay a fancy price for it. The use of a few terrapin bones in the dish when served has likely aided in this deception.

In some of the Eastern States the carcass brings from 30 to 40 cents, more than double the price once paid for its pelt. It seems unfortunate, therefore, that several million pounds of available food must go to waste annually; yet for many years its coat was rated among those of the humblest of fur-bearers, and at times the traders of the North refused to take them from the trappers, the skins being practically valueless in the market. In recent years the really beautiful fur of these animals has become more and more appreciated.

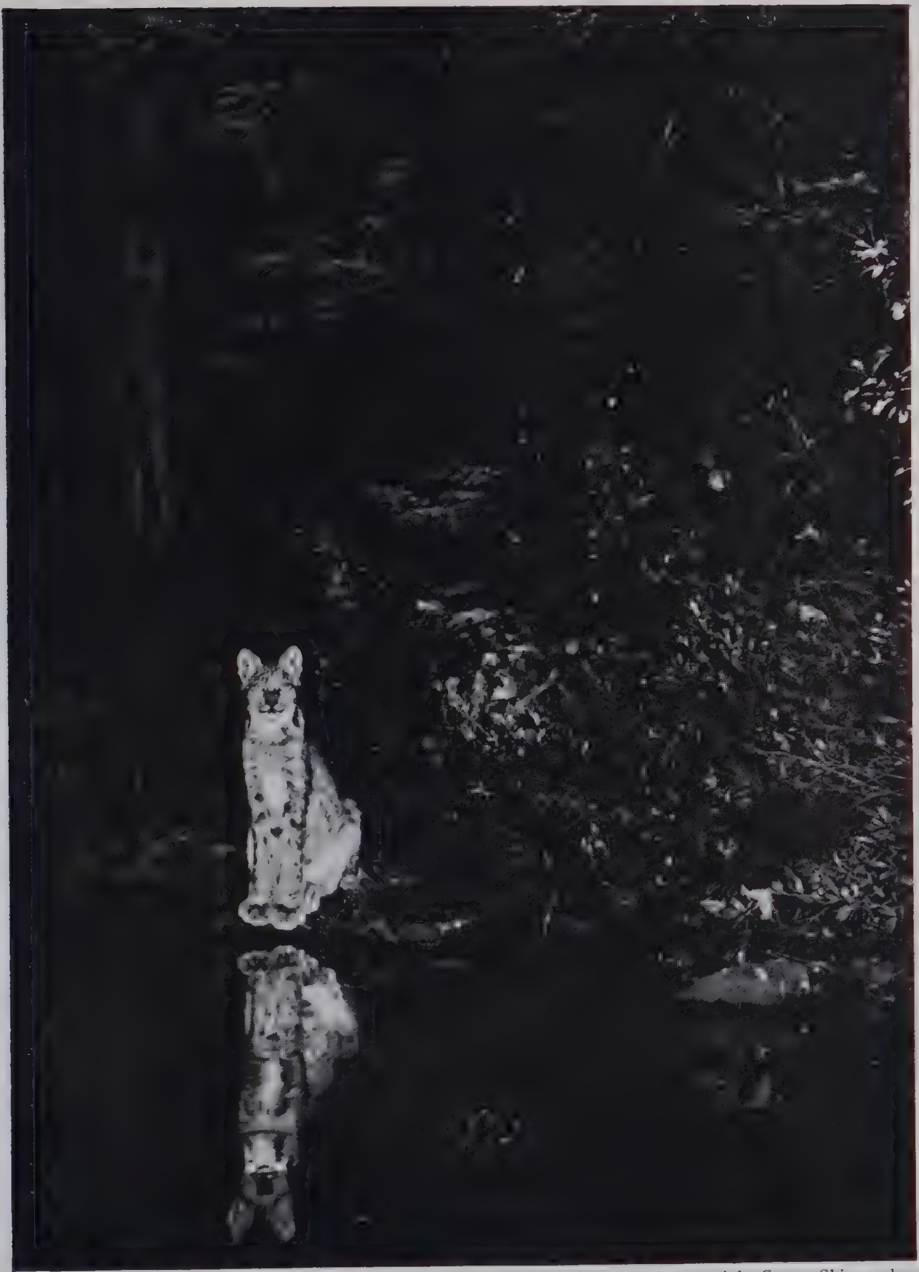
In 1920, at the crest of high prices, muskrat skins were sold in fur auctions up to a maximum price of $7.50 each. Today the muskrat, on account of the enormous number of its skins and their appreciated price, has become the most important of North American fur-bearers.

Thus it is apparent this American fur-bearer has reached the top in the total value of its pelts and in striking contrast to its status a few years ago.

Restore to it the old Indian name of musquash and the prejudice against the use of its fur or its flesh for food will rapidly disappear.

BIRDS AND ANIMALS MULTIPLY IN CUT-OVER AREAS

Partly because the subject has seldom been considered in print, and again because its significance is so little understood, the wonderful part that second-



Photograph by George Shiras, 3d

A UNIQUE NIGHT PICTURE OF A LYNX

This animal can seldom be photographed in the daytime and at night has a strong aversion to artificial light. In this instance, however, the subject sat erect on the edge of the bank watching the approaching jack-light, its reflection in the water doubling the image. Taken on a small lake in western Ontario.

growth vegetation in deforested areas plays in the distribution and relative numbers of birds and animals is worthy of further comment.

In the thousands of miles of wilderness surrounding Lake Superior, the present conditions, so far as Nature is concerned, are better for its wild life than before the coming of the white man, centuries ago; for there is a larger and greater variety of food and better shelter than ever before—two great factors in a suitable habitat.

Other factors of importance are the favorable climatic conditions which about Lake Superior are stabilized and devoid of extremes through the influence of the deeper waters of the lake which remain close to 39° throughout the year. The prevailing northwest winds of summer are cool and bracing, without rain or noticeable humidity, for the warmer and drier air ashore readily absorbs the moisture in the air from the lake, producing the exhilaration of high altitudes, free from the heart strain of a rarefied atmosphere.

Once unbroken evergreen forests covered much of the land. Back from the waters the tops of the towering pines and hemlocks, interlocking, excluded the warm rays of the sun and the bountiful dews; so that only a scant vegetation struggled in the perpetual shadows and in the sour soil, brown with the successive fall of needles.

In these primeval forests there was little food or shelter, for the giant trunks were almost limbless to the green canopy above. In the other sections, where hardwood forests predominated, conditions were equally unpropitious; for neither tender bark, leaves, nor budding branches were in reach of browsing animals.

In the early lumbering operations only the largest trees were cut, the removal hardly leaving a trace, and when one passed through this densely timbered land he seldom expected to see a living thing beyond, perhaps, a porcupine, a red squirrel, or a woodpecker drilling on a dying tree.

Finally came the period of intensive lumbering, where trees of every kind yielded to the axe or went down beneath the crash of a larger neighbor.

Many times came the warning from experienced hunters that the game was doomed; for the sight of cut-over land piled high with wreckage, the discarded limbs smothering all vegetation and discouraging any of a different kind, certainly gave color to these views. But in a few years fires or decay prepared the devastated areas for a new growth, giving assurance of better things.

Where once stood solid forests of pine, cedar, balsam, and hemlock, these were reproduced, the young trees, however, being low-branched and thick, blocking the driven snow and cutting winds, thus sheltering the game from the eye of man and putting food within easy reach.

LARGE CLEARINGS CREATED

Later came the removal of the matured hardwood maples, in hundreds of tracts of twenty to forty acres, creating clearings of unusual size, where the succeeding deciduous growths differed greatly from the original stock, consisting of rapidly growing trees like the poplar, white birch, cherry, alder, and mountain-ash, interspersed with a great variety of berries and low-growing plants, including clover and timothy, introduced by the wind-scattered fodder of many a logging team.

Here came the deer, rabbits, bears, grouse, and hundreds of berry- and insect-eating songsters, many of them new to the land, while the beaver took possession of streams and lakes bordered with these new growths.

In this region Nature, despite man's grasping ways, provides more abundantly than ever food and shelter for the birds and animals, and these bounties should be met in an appreciative way, making it possible for the wild life of the upper region to continue furnishing its valuable quota in meeting our necessities and in the gratification of our outdoor pleasures.

PROTECTING THE UNITED STATES FROM PLANT PESTS

By Charles Lester Marlatt

Chairman, Federal Horticultural Board, U. S. Department of Agriculture

With Photographs from the U. S. Department of Agriculture

Some ten years ago the National Geographic Magazine, *by the publication of an article on "pests and parasites," aided materially in securing the passage of a national law to prevent importation of insect-infested and diseased plants.* The accompanying article and the illustrations indicate the character of plant pests which are being intercepted by this law.*

PRIOR to 1912 there was no authority in law to protect the United States from the entry of new plant enemies or to control and prevent the distribution within the United States of any such enemies which may have gained limited foothold.

Not only could plants be imported by nursery and florist establishments without regard to their freedom from pests, but, in the absence of any protective legislation, America became a dumping ground for the plant refuse of other countries.

It was common practice of big nursery establishments abroad to consign, without order, tons of their culls to department stores, to florists, and even to auctioneers of this country, to be sold or given away by such stores or auctioned for what they would bring.

This freedom of entry, in the absence of authority for inspection or other insurance of freedom from insect pests and diseases, has resulted during the last century in the establishment in the United States of an enormous number of foreign plant pests which are, and will remain, a tremendous burden on the garden, field, and forest productions of this country.

THE FOOD BILL OF PLANT PESTS OF FOREIGN ORIGIN

Several years ago the Department of Agriculture issued a careful analysis of the losses caused to the principal crops of the United States by insect pests, showing that these losses amounted to upward of a billion dollars a year, a sum at that time more than sufficient to meet the entire cost of the administration of the Federal Government! That was under the old price of crops. Under recent prices these losses would approximate two billion dollars annually![†]

These estimates relate solely to losses due to the insect pests and take no account of the losses due to such plant diseases as the grain rusts and smuts and the mildews, blights, and hundreds of other diseases affecting every important crop and also many forest trees and ornamentals. Such plant diseases probably occasion losses fully comparable to those due to insects.

These losses are caused by a host of pests, insect and fungous, that affect fruits, farm crops, and forest trees, *but more than 50 per cent of these losses are due to insect and diseases which have come to us from foreign lands.* Among these are some of the worst enemies of our principal crops.

Examples of such are the Hessian fly, the boll weevil of cotton, the alfalfa weevil, the Japanese beetle, the San José scale, and such plant diseases as the wheat smut, pine blister rust, citrus canker, potato wart, chestnut blight, and many others.

Altogether, these unwelcome immigrants, insects and diseases, include upward of 100 important plant enemies and

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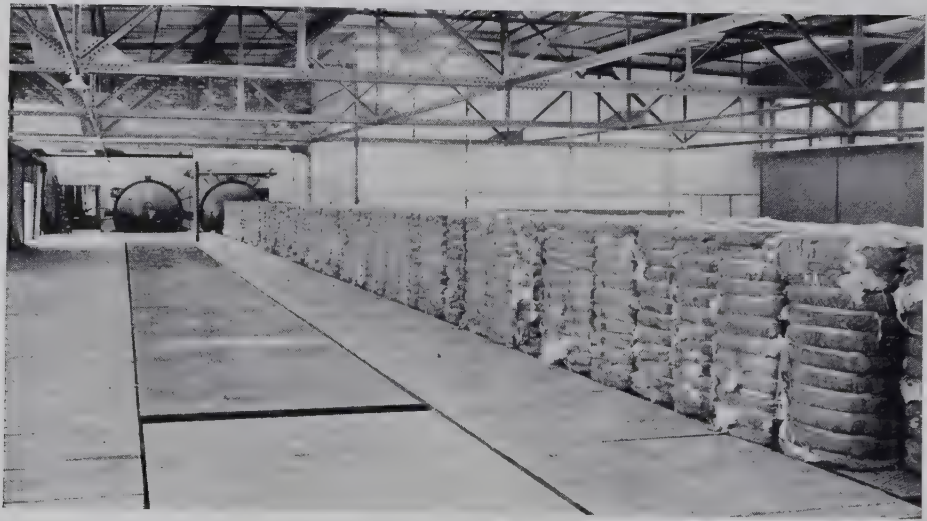
* Pests and Parasites; Why We Need a National Law to Prevent Importation of Insect-Infested and Diseased Plants. By Charles Lester Marlatt. National Geographic Magazine, April, 1911.

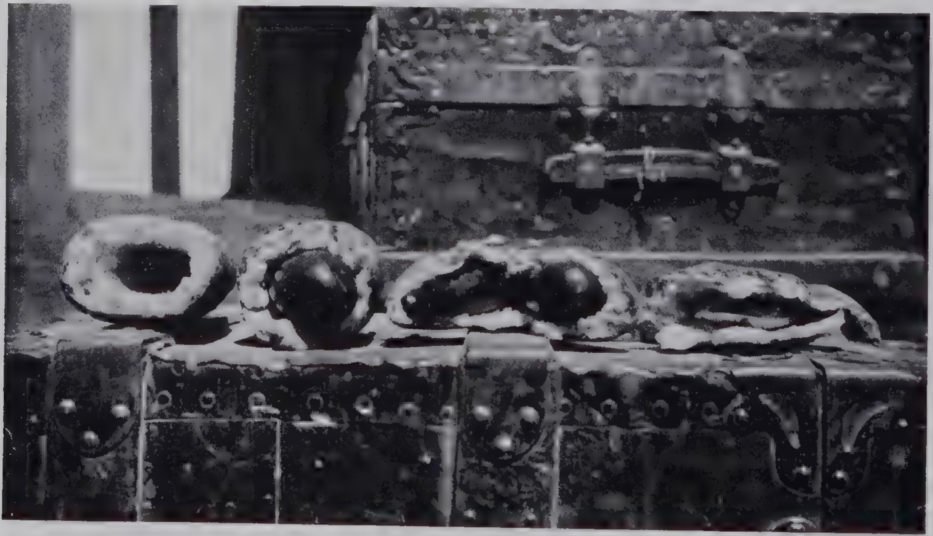
[†] The detailed discussion of these losses is published in the Year Book of the Department of Agriculture for 1904, and a later summary is given in the report of the Roosevelt National Conservation Commission.



DISINFECTION OF EGYPTIAN COTTON TO EXCLUDE THE PINK BOLLWORM

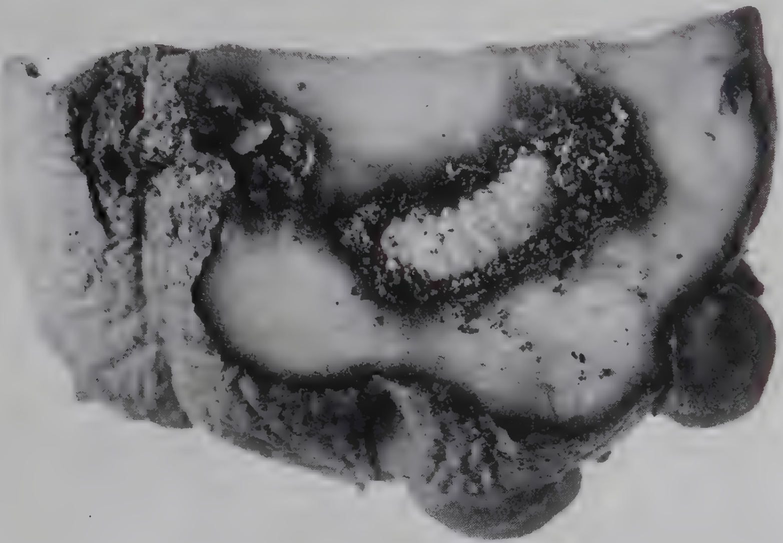
The worst of all cotton pests is the pink bollworm, the larva of a minute moth. The larvæ feed in the bolls and destroy the forming lint. This pest originated in India and reached Egypt about 15 years ago with some importations of cotton, and has since been distributed with Egyptian cotton seed to practically every cotton-producing country of the world. It reached Texas via Mexico in 1916, and since that time Congress has appropriated upward of $2,500,000 to be used in an effort to exterminate this pest.

This illustration shows the method of disinfecting Egyptian cotton. The entire row of cotton bales is carried at one time into a huge steel cylinder, shown at the end of the picture, by means of a movable platform. The cylinder then is hermetically closed and the air exhausted, creating a vacuum. The poisonous cyanide gas is then allowed to enter the cylinder, and the vacuum insures penetration of this gas to the very center of the bale, destroying all insects. This is the largest fumigating plant in the world, and each cylinder has a capacity of over 100 bales of cotton at one time.



A SPECIAL SENSE MUST BE DEVELOPED BY THE PLANT INSPECTOR

This photograph illustrates an effort to bring alligator pears into the United States from Mexico imbedded in partly baked loaves of bread, in violation of a Federal embargo on account of pests.

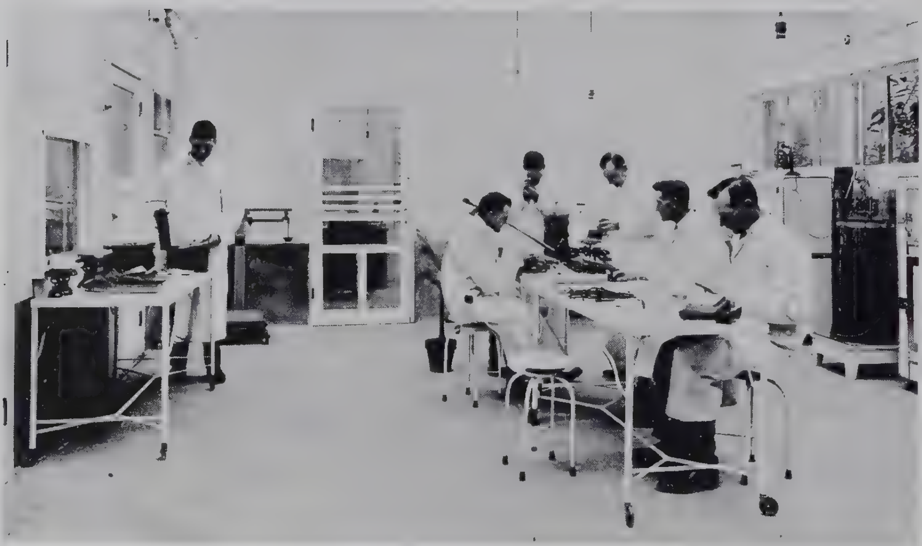


NATIVE POTATO WEEVILS FROM THE ANDEAN REGION OF SOUTH AMERICA

The Irish potato and the Indian corn are the two great food crops of the world of American origin. The potato is supposed to have come originally from South America. It is now discovered that in the Andean region this tuber is infested by a number of native weevils, which mine through the potatoes and render them worthless. It is a piece of tremendous good fortune to the world that the distribution of the potatoes has been from North America, where these weevils do not occur. Recent shipments of potatoes from the Andean region have resulted in the discovery of no less than four such weevils, one of which, with its work, is illustrated in the accompanying photograph.

COLLECTING JAPANESE BEETLES FOR WAGES

Boys earn modest wages by collecting Japanese beetles with nets in the heart of infested territory. The object is to reduce their numbers along roadways, so as to lessen the risk of their being carried by passing automobiles. The collected beetles are destroyed with oil.

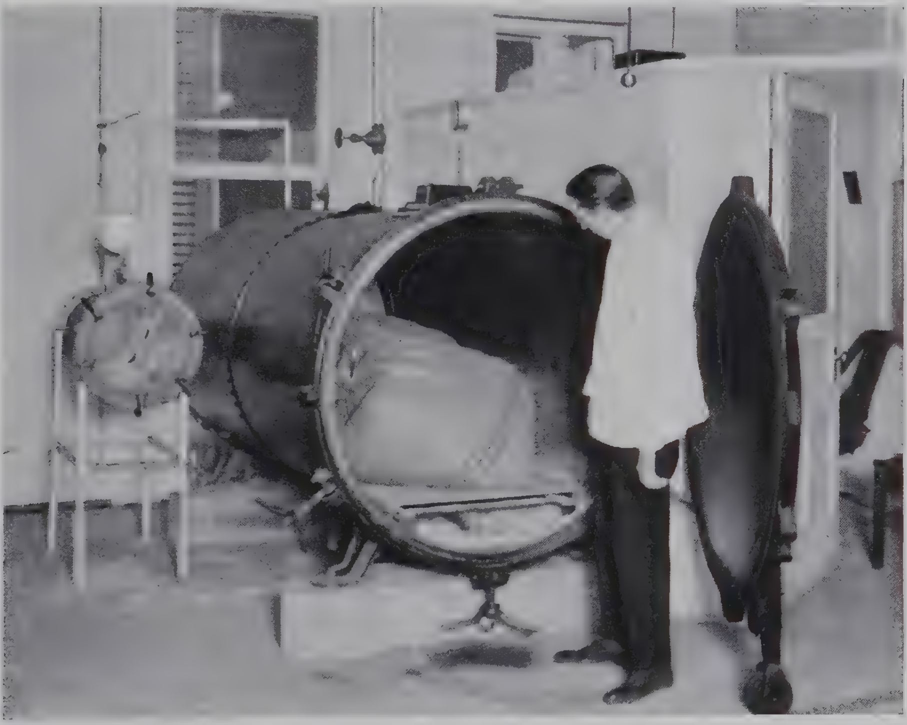


EXAMINING PLANT IMMIGRANTS TO SEE WHETHER THEY ARE HEALTHY

More than 10,000 naturalized plant citizens of the United States have been brought from every quarter of the world by plant explorers of the Department of Agriculture. All of these plants, as well as commercial importations, are carefully examined for injurious insects and plant diseases. If necessary, such plants are disinfected by fumigation, or destroyed if fumigation cannot be relied upon to eliminate any accompanying pests.

A SEARCH FOR FUNGI AND INSECTS AT A HORTICULTURAL "ELLIS ISLAND"

These lilies-of-the-valley roots may neither toil nor spin, but they require patient work on the part of experts from the Office of Plant Introduction to prevent the admission to the United States of undesirable parasites.



A BIG DRUM IN WHICH PLANTS ARE FUMIGATED

The inspection and disinfection to which plants imported by the Office of Plant Introduction of the Department of Agriculture are subjected has during the last year been extended to most of the commercial importations. The room shown in this illustration is equipped with a cylinder for fumigation under vacuum conditions, and with other disinfecting chambers and apparatus.

many hundreds of lesser importance, and their board and lodging, as just noted, costs this nation nearly a billion dollars annually.

THE COST OF SOME INDIVIDUAL LODGERS

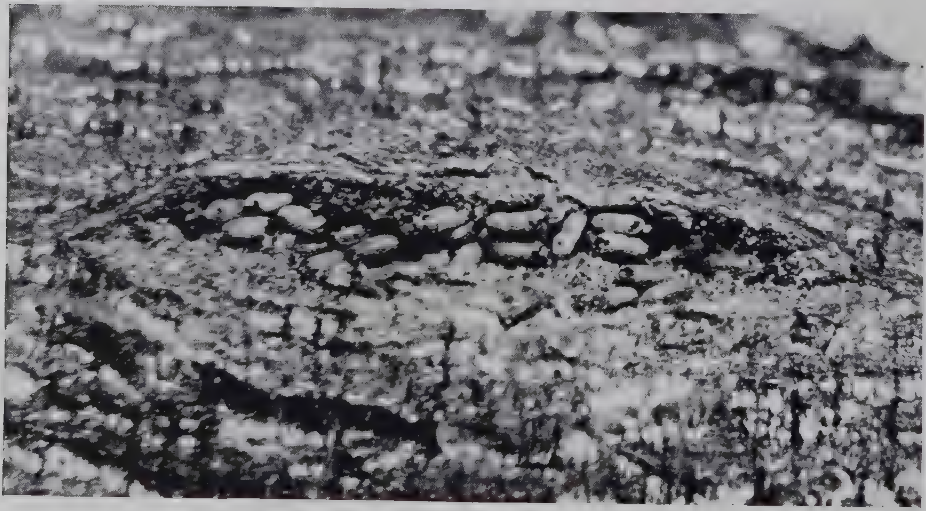
The San José scale, which was introduced with flowering peach from China some 40 years ago, is now costing this country at least $10,000,000 a year for the spraying of orchards and in reduced output and value of fruit crops. Very conservatively estimated, this means an unnecessary food bill of $200,000,000 which we have paid out during these 40 years, upon the basis of one-half the annual charges for the last 20 years.

Similarly, citrus canker, introduced with Japanese trifoliate orange stock some 13 years ago, has cost in actual expenditures of Federal and State moneys in control work approximately $2,130,000, of which $1,273,000 were appropriated by Congress, and in value of orchards and nurseries which have been burned to the ground in the effort to exterminate this disease in Florida and other Gulf States, $11,063,000, or a total of $13,193,000!

Furthermore, this estimate makes no account of the losses chargeable to reduced orange and other citrus crops on account of the disease and orchards destroyed. That is paying very dearly for a few plants of trivial value which in fact, easily and without risk, could have been grown from seed.

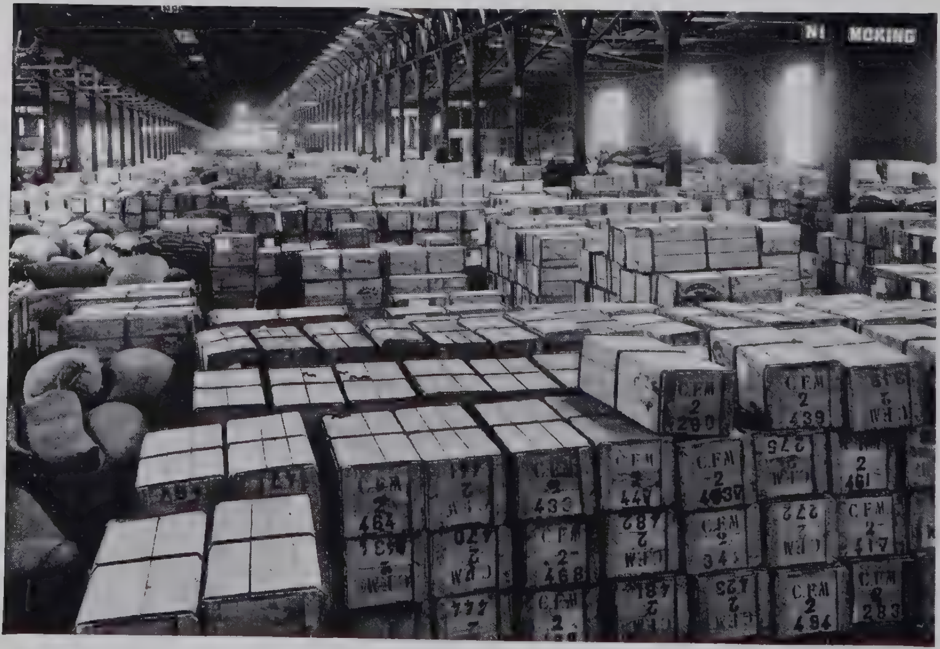
THE ORIENTAL FRUIT WORM CAME WITH THE JAPANESE CHERRY

The Oriental fruit worm, brought to this country with flowering Japanese cherries about 1911, when a widespread



THE LESSON OF A CRACK IN THE BARK

This bit of bark, to the unaided eye, had the appearance of any normal bark filled with numerous cracks; but many of these apparently harmless-looking cracks, when examined under a magnifying glass, proved to be filled with the eggs of a camphor thrips, a pest which now threatens failure to what was believed to be a promising camphor industry in Florida. Pests introduced in this obscure manner may cost the country millions.



EIGHTEEN MILLION NARCISSUS BULBS IN FIFTEEN THOUSAND CASES!

Unlimited importation is still permitted of the more popular bulbs, including narcissus, tulip, hyacinth, lily, and crocus. The photograph illustrates a single shipment of narcissus bulbs on the dock at New York awaiting distribution. There is still some risk of the entry of new pests, even with such clean bulbs, and it is hoped that the time may soon come when these bulbs will be produced in this country in sufficient quantities to meet home needs.

popular demand for this beautiful flowering tree developed, promises to be one of the most serious checks that has ever threatened our common deciduous fruits—peach, plum, prune, apple, pear, etc.

It is now firmly established in some half a dozen eastern States and probably has been even much more widely distributed through the agency of miscellaneous importations of flowering cherries, so that its ultimate spread throughout the United States cannot now be prevented. This insect is another serious pest introduced with ornamentals that will in a few years cause a continual annual charge to fruit production of millions of dollars.

The Japanese beetle is another new pest of wide range of food habit and likely to cause in the near future tremendous annual losses to all kinds of fruits, including not only apple, pear, and plum, etc., but also grape and small fruits. It not only destroys the foliage, but eats into the ripening fruit and renders it unsalable. It breeds in garden, lawn, and pasture lands as a soil-inhabiting white grub.

The evidence indicates conclusively that it was introduced about a decade ago in soil with an importation of Japanese Iris roots, and has now spread over a fairly large section of New Jersey and into contiguous portions of Pennsylvania. There is now no possibility of exterminating it, and its board bill will be a continuing charge, perhaps ranking ultimately with that of the San José scale.

The introduced diseases of forest trees, such as the pine blister rust, the chestnut blight, and the insect and disease enemies of the cereal and forage plants, are vastly more expensive lodgers than those just mentioned and, as already indicated, furnish the larger items making up the half billion to a billion dollar annual cost due to imported plant pests.

These undesirable immigrants we must lodge and board forever, but we want to shut the doors if we can to their brothers and sisters and cousins and aunts!

MANY OTHER PLANT ENEMIES TO BE EXCLUDED

These hundreds of foreign pests have become permanent factors in American agriculture and horticulture. They ought to have been kept out, and America would then have enjoyed a tremendous advantage over the old world; but late as the action was taken, it was still opportune.

SMUGGLING CONTRABAND "FRUIT"

A customs inspectress at Laredo, Texas, has taken a bag of alligator pears hidden in a woman's skirts. The smaller bag contained evidence of violation of the Volstead Act.

The Department of Agriculture recently compiled and published a catalogue of the more dangerous insect enemies of plants in foreign countries which for the most part have not yet gained entry into the United States. This catalogue was issued as a hand-book for the information of the plant quarantine inspectors, Federal and State.

In it are listed some 3,000 different foreign insect pests! These include insects injurious to forest and shade trees, to fruit and ornamental trees, and to the various farm and garden crops.

A similar manual, which is in course of preparation, lists the known foreign fungous diseases of plants, and will describe and catalogue, when completed,

ITALIAN BROOM-CORN INFESTED WITH CORN-BORER

It is now pretty well established that the European corn-borer reached this country through shipments of Italian and Austro-Hungarian broom-corn. This picture shows a shipment of Italian broom-corn which arrived at New York in February, 1920, and on examination proved to be infested with this dreaded European pest. All foreign broom-corn is now subjected to steam cooking as a condition of entry. This does not injure it for broom manufacture, but kills any harbored insects. The corn-borer illustrates the continuing risk of the entry of new pests with almost any sort of plant material, whether for manufacture or as packing for other articles of commerce, and indicates the breadth of the field which must be guarded if foreign plant pests are to be excluded (see next page).

probably as many diseases as there were insects included in the insect-pest catalogue.

Many of these insects and diseases are known to be as serious enemies as many of the worst of those already introduced.

These catalogues and lists will, however, enumerate only the known plant enemies. Most of the recent introductions from foreign lands of important pests have been of insects or diseases of which literature and available records gave us no warning.

Enormous areas in the old world have been little or not at all explored with respect to such plant enemies. This applies particularly to China, Africa, and even to much of Europe, and from these areas particularly have come pests like the San José scale, the Oriental fruit worm, the citrus canker, and the chestnut blight, none of which were recognized as important plant enemies prior to their importation and establishment in this country.

LIVING PLANTS COMMON CARRIERS OF NEW PESTS

Most of these introduced plant enemies have come to this country in connection with living plants and many of them with florist and ornamental stock. In many instances the imported ornamental or other plant has been a mere accidental carrier of the new enemy. For example, the European alfalfa weevil, which is now largely reducing the output of alfalfa in half a dozen States in the middle West, was undoubtedly introduced with soil about imported plants. This weevil hibernates in the soil, and the only known means by which it could have reached the State of Utah, where it got its first foothold, is in soil with imported plants. Other weevils of foreign origin, affecting clover and other plants, have undoubtedly been similarly introduced. The Japanese beetle is a recent instance of such introductions.

The European earwig was also introduced in soil with imported plants and is perhaps an exception to the rule, in that it has been very troublesome to ornamentals in the highly developed estates of Newport, where it got its first foothold. It is notably a pest of garden and ornamental plants as well as a very obnoxious house pest and promises a very unsavory future record.

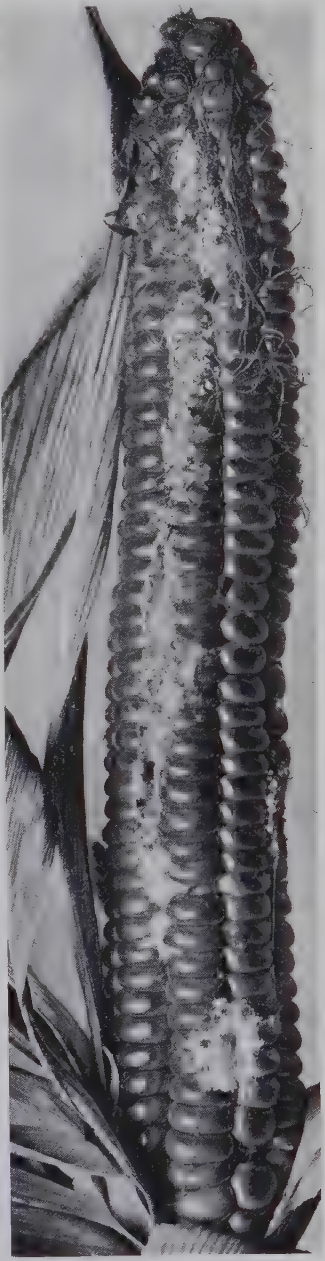
These instances are, perhaps, sufficient to illustrate the danger of bringing in pests with wide possibilities of damage more or less accidentally with ornamentals or other living plants.

Some of these foreign plant enemies have come in in other ways: The Hessian fly with straw; the Argentine ant possibly merely as a stowaway in the cargo of some ship coming to New Orleans; and the corn-borer with imported broom-corn. It is entirely possible, however, for both of the latter pests to be carried by living plants—the Argentine ant in soil and the corn-borer in any of the many ornamental plants which it is known freely to infest.

But looking over the record of these introductions, from early colonial times to the present, it is apparent that 90 per cent of these foreign pests have come in with living plant material of one sort or another.

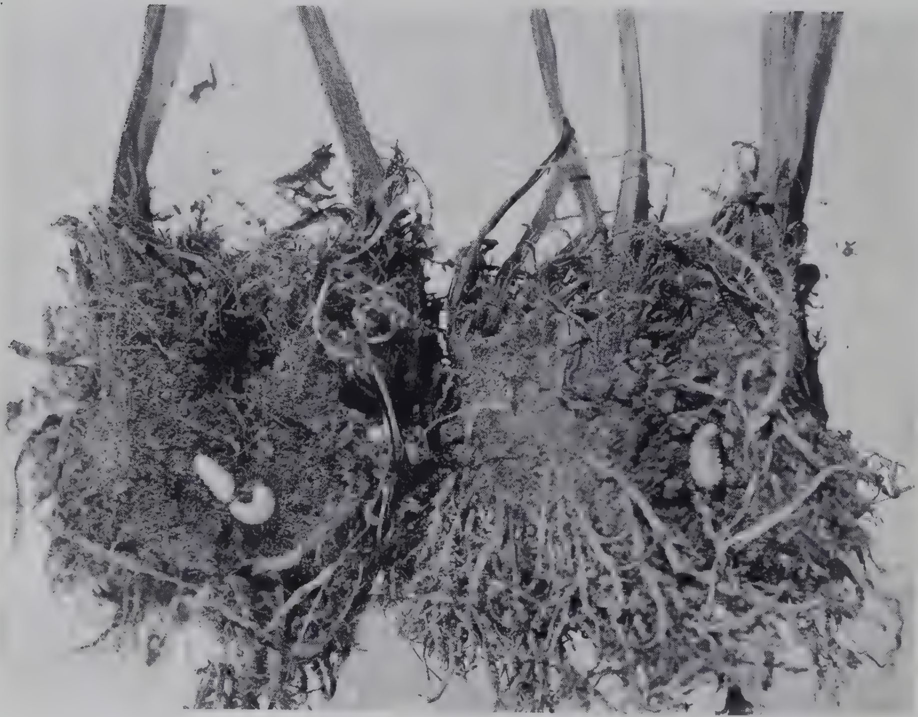
FOREIGN COUNTRIES LONG PROTECTED

For some 30 or 40 years prior to 1912, when there was no authority in law to control plant importations into the United States, the more important exporting European nations which were finding free markets in this country for their plant products—wiser than we—to protect their own cultures, were prohibiting



THE WORK OF THE EUROPEAN CORN-BORER IN AN EAR OF FLINT CORN

This European pest was brought to the United States in 1908 or 1909 with importations of broom-corn, and gained footholds near Boston and in western New York and also in southern Ontario (see preceding page).



SOIL ABOUT PLANT ROOTS A COMMON MEANS OF ENTRY OF PESTS

Moist earth such as comes about many plants has been the source of entry of a host of our worst plant enemies, such as the Japanese beetle, the alfalfa weevil, and many others. No method of disinfecting such earth with poisons is possible without killing the plants. Moist earth is one of the best "gas masks," and many lives undoubtedly could have been saved in France if the soldiers, before the gas masks had been devised, had filled their handkerchiefs with moist soil and breathed through these at times of danger.

The photograph is of Japanese iris roots, and in the surrounding soil are the grubs of a pest unknown in the United States, related to the Japanese beetle. Needless to say, this entire shipment was destroyed.

entry of living plants from the United States. These prohibitions, first based on the grape phylloxera and later more widely extended on account of the San José scale, were usually absolute and therefore much more drastic than the ones now enforced under our own quarantine law.

For example, no living plants from America have for many years been permitted to enter France, Germany, or Holland, while similar or modified restrictions have been long enforced by other European countries.

A PROTECTIVE LAW FOR THE UNITED STATES

The need for national quarantine legislation for the protection of the farm, garden, and forest interests of this country from further invasions by foreign pests was long appreciated, but the securing of this legislation necessitated an extended period of earnest effort.

Toward the end of this period this legislation was hastened by the increasing numbers of gipsy and brown-tail moths found during the years 1909-12 on imported plants, and also by many other insects and plant diseases and by the need, which began to be generally appreciated, of excluding such other important pests as the Mediterranean fruit fly, the potato wart, and the white pine blister rust.

The movement was aided also by the experience with the chestnut blight and the San José scale. The entry of the citrus canker, the Japanese beetle, and

PROTECTING CUCURBITS FROM ATTACK BY MELON FLIES

No effective control of this pest is possible except to enclose the young fruits in a paper sack immediately after the bloom has been fertilized. The illustration shows this method as employed by Oriental market gardeners in Hawaii.

the European corn-borer all occurred during the last years of the effort to secure this legislation and before it was actually enacted, although the fact of the entry and establishment of these pests was not determined until several years later.

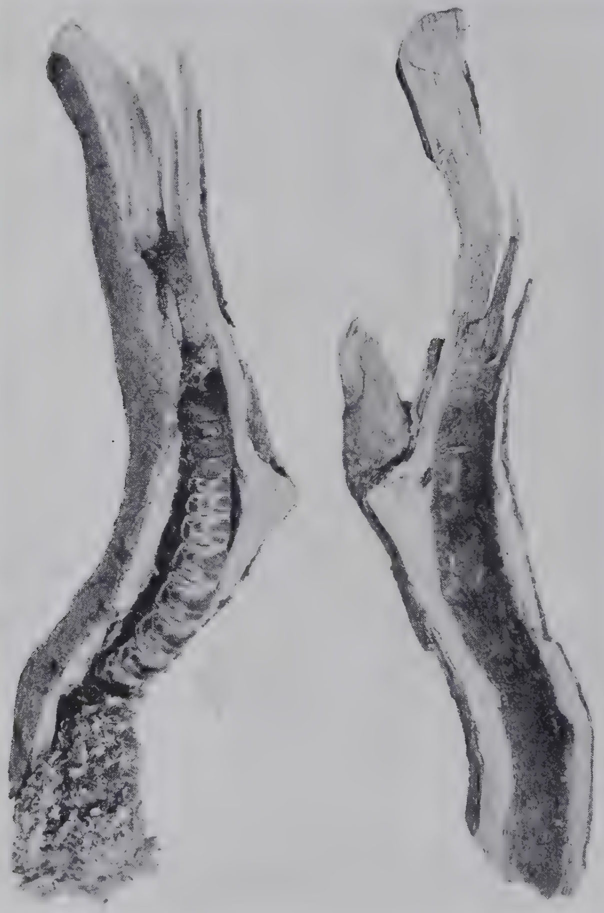
The Plant Quarantine Act of 1912 was the final outcome of this 14-year effort to secure authority to protect the United States, so far as possible, from further entry of plant pests. In connection with broad quarantine and regulatory powers, this act makes specific provision for the regulation of the entry of nursery stock and other plants.

ADEQUATE CONTROL BY INSPECTION AND CERTIFICATION PROVES IMPOSSIBLE

During the first seven years of the enforcement of the act an effort was made to prevent the entry of new plant pests by relying as safeguards on foreign inspection and certification. These were made in the countries of export by the most expert officials available, and as an additional safeguard provision was made for reinspection of these importations at destination in this country, either by Federal or by State inspectors. This reinspection has given us a fairly just appreciation of the continuing risk with the entry of such inspected and certified plants.

It is true that under this system, in which the best skill both abroad and at home was employed, much improvement was made in the health status of the imported plants, and infection was undoubtedly reduced to probably as near a minimum as is humanly possible.

The record, however, of the seven years of interceptions of plant pests in connection with imported plants indicates very clearly that in spite of these safeguards numbers of injurious insects and plant



LIVING WOOD-BORING WORMS IMPORTED AS "MEDICINE"

The plant quarantine service of the Department of Agriculture calls into coöperation many other departments of the government, such as the Post-Office, State, and Treasury Departments, etc. The larva shown in this photograph was one of a shipment from Japan invoiced as "medicine" and intercepted and turned over to the Federal inspectors by the postmaster at San Francisco.

diseases were being brought to the United States every year and with almost every considerable importation of plants.

These records are, furthermore, by no means complete, inasmuch as many of the States were unable to inspect all of the shipments at destination and, furthermore, no inspection, however expert, can be relied upon to discover and eliminate all instances of infestation or contagion.

Inasmuch as it has been urged that adequate inspection abroad would eliminate these dangers, it is, perhaps, opportune to introduce at this time a summary of the plant pests intercepted on such importations from the principal exporting countries of the world during these seven years.

INJURIOUS INSECTS INTERCEPTED IN RECENT YEARS

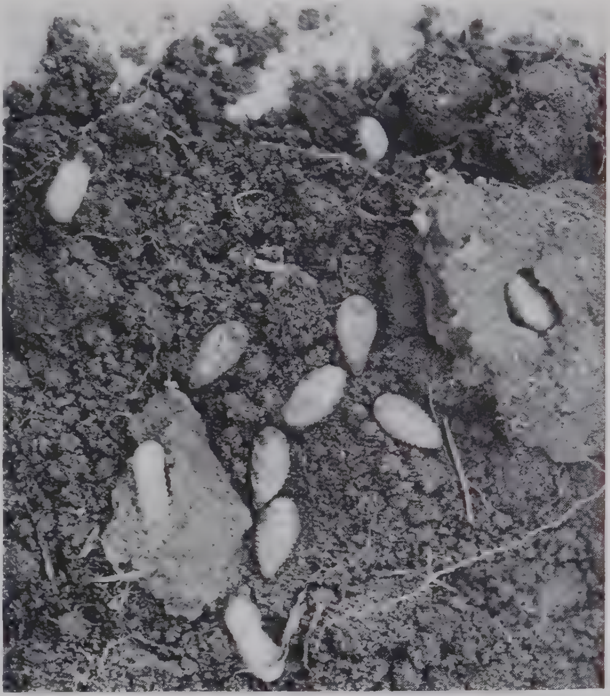
The countries made the subject of these records are those having the best and most expert inspection service and from which the plants coming to us have been in the best condition as to freedom from pests and general sanitation.

During this seven-year period, 1912-1919, there were received from Holland 1,051 infested shipments, involving 148 kinds of insect pests; from Belgium 1,306 infested shipments, involving 64 kinds of insects; from France 347 infested shipments, involving 89 kinds of insects; from England 154 infested shipments, involving 62 kinds of insects; from Japan 291 infested shipments, involving 108 kinds of insects, and from Germany 12 infested shipments, involving 15 kinds of insect pests.

As already indicated, these records are by no means necessarily complete, and, furthermore, in the instance of the State of New York, which receives the bulk of the foreign plant shipments, reports were made to the Department of Agriculture only of the most important findings. Many of these intercepted insects are not now known to be established anywhere in this country, and numbers of them, if established, would become important farm, garden, or forest pests.

Discussing briefly some of these interceptions, the European tussock moth, *Notolophus antigua,* an injurious forest and ornamental plant insect, was found in connection with no less than 67 different shipments of plants from Holland, involving some 16 different kinds of ornamental plants. Such important and easily detected pests as the gipsy and browntail moths were found respectively, in the egg and arval stages on no less than 63 different shipments of plants. These are merely typical illustrations out of many which could be afforded.

Practically all of these injurious insects which have been thus intercepted have been carried by the aërial portions of the plants and include few, if any, of the often more dangerous species hibernating in the soil about plants imported in balls of earth or in pots. It is not possible, without the destruction of the plants, to disintegrate and make an adequate examination of such soil, and no disinfection of such soil has proven possible without killing the plants.



THE JAPANESE BEETLE BREEDS IN THE SOIL

A spadeful of soil taken in a New Jersey meadow in the infested district is illustrated above. The eggs of the Japanese beetle are placed in the soil in pasture and other uncultivated lands during the summer, and the insect develops as a white grub, and later transforms into a pupa or chrysalis, and eventually into the mature beetle. The only method of reaching the weevil in the soil is by soaking it with powerful poisons—a very expensive and not altogether effective treatment.

PLANT DISEASES INTERCEPTED SINCE 1912

There is risk of entry through the medium of soil of a vast number of insects which, as elsewhere indicated, may have no relation to the plants imported, but may become important enemies of various field crops. The possibilities of such introductions of insects with soil are very large and are not theoretical, as indicated by the examples of such importations already given.

It is even more difficult to exclude plant diseases than it is insect pests, and in the case of many such diseases inspection is very often a safeguard of little importance. Many of these diseases are not discoverable by inspection or may develop to a visible stage only after a period of months or even years after the plants have been imported.

The pine blister rust, for example, cannot be determined often for five or six years, and other similar diseases may be in the tissues of the host plants and remain undiscoverable by any technical method except by planting and growth for a long period in quarantine.

With respect to the risk of introduction of dangerous diseases from Europe, it is significant that of the three serious diseases of forest trees that have been introduced into this country in recent years, two of them—the white pine blister rust and the European poplar canker—have come from Europe, where both of these diseases are well known, and in spite of the protection of European inspection service. The chestnut blight and the citrus canker similarly came from Japan, but in the case of these diseases no recognition of them had been made prior to their gaining foothold in this country.

INADEQUACY OF SPECIAL QUARANTINES

To prevent the entry of plant pests, quarantines and restrictions have been applied under the Plant Quarantine Act to all important dangers as they appear, and in this piecemeal fashion some twenty-two restrictive orders and quarantines are now in force against foreign plants and plant products. Such piecemeal action can be taken, however, only when the enemy is known, and gives no security against such unknown or unanticipated enemies as the San José scale, the Oriental peach moth, the Japanese beetle, the chestnut blight, and the citrus canker.

After having studied this subject, as indicated, for many years and after having given earnest consideration and a practical test of the possible alternatives of inspection and disinfection of plant imports, the experts of the Department of Agriculture and of the several States reached the conclusion that the only possible solution of this problem, which was constantly becoming more serious with the widening of commerce, is the policy of practical exclusion of all plant stock not absolutely essential to the horticultural, floricultural, and forestry needs of the United States. The existing control of plant importations is based on this principle. It is perfectly evident that no other system will give adequate protection to the great plant interests of this country.

ANY NEEDED PLANTS MAY BE IMPORTED

Ample provision has been made for the importation into the United States of any plant whatsoever, whether for introduction, experimentation, scientific, or other purpose.

In other words, no plants are absolutely denied entry into the United States under this or any other Federal quarantine, nor does the Department wish or intend now or at any time to make it impossible to secure new or old plants for which any reasonable introduction need can be indicated.

In addition to the provision in the quarantine for unlimited importation of certain classes of plants which are deemed essential to the horticulture and floriculture of this country, some 650 permits have been issued for the other, or so-called "prohibited, plants," for the purpose of establishing new plant-propagating enterprises which shall in a reasonable time supply our future needs.

Under these permits, entry has been authorized of upward of 16,000,000 of these so-called "prohibited plants," involving approximately 5,000 different kinds of plants. These importations are now being propagated and reproduced in hundreds of establishments in some 25 different States.

TRYING TO LESSEN RISK

It is the intention of the Department to continue to permit such entry of any necessary plant for the purpose indicated, to eliminate as soon as possible dependency on foreign countries, and thus attain the main purpose of the quarantine, in greatly lessening the risk of entry of new plant pests.

The existing restrictions on the entry of plants have been modified several times, and are subject to future modification upon presentation of adequate reasons therefor, and when such action can be taken without opening dangers which the quarantine is designed to guard against.

It would certainly seem to be good business and practical common sense to restrict as far as possible importations of plants which in the past have proven so disastrous to the agriculture and horticulture of this country. It is certainly unthinkable that the farm and garden and orchard and forestry interests of the United States or that any plant lover should want to return to the old system.

The plant life of America merits the same protection that is given to animals and man to ward off foreign scourges.

If the average American knew as much of plant diseases as he does of human and animal diseases, the necessity of a quarantine against infected plants would not need to be sustained by argument.